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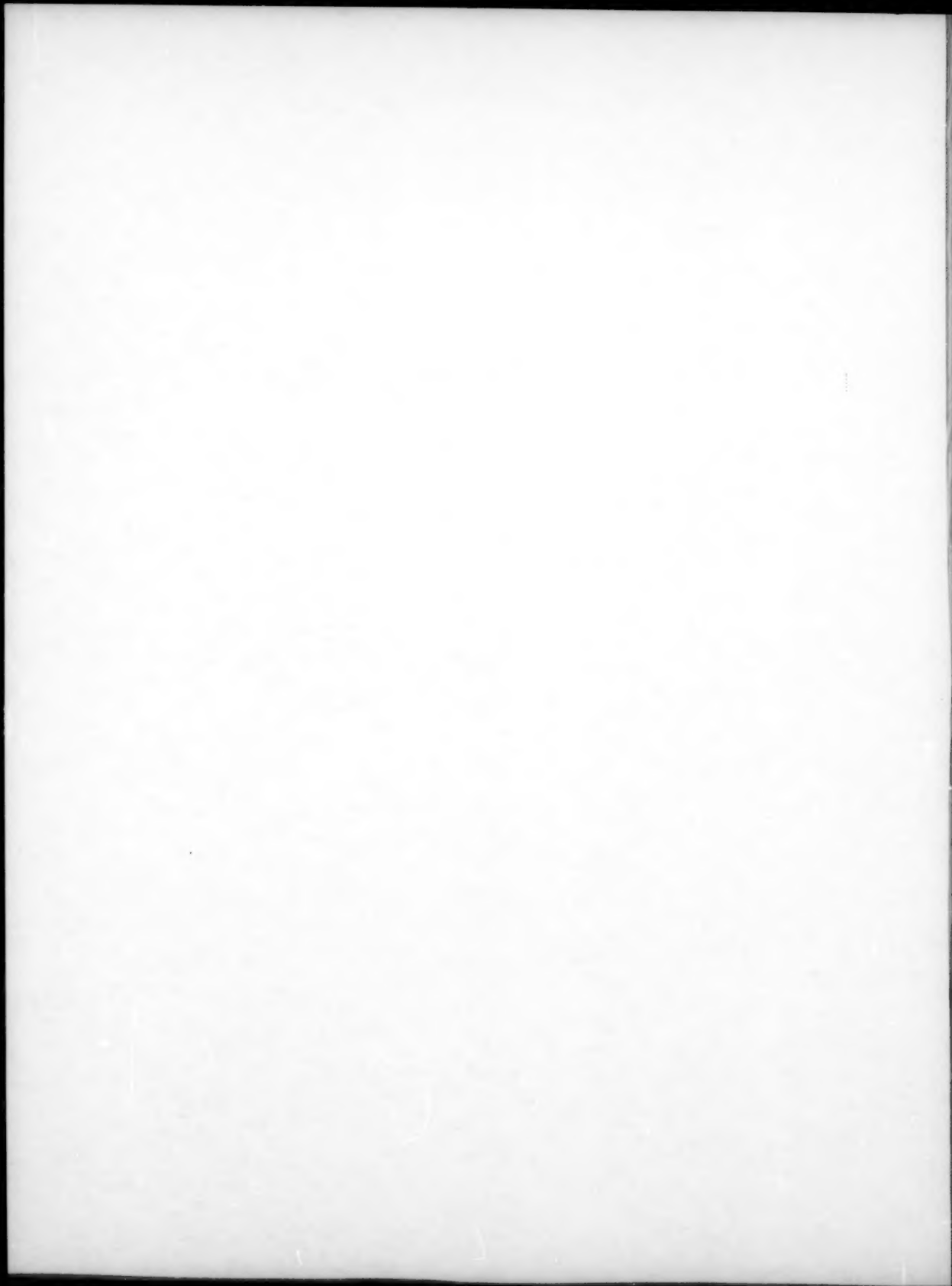
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## CONTENTS

	<i>Page</i>	<i>Fiche</i>
AUTHOR INDEX.....	1	1-A6
SUBJECT HEADINGS.....	93	1-G11
SUBJECT INDEX .....	97	1-G14



# 1983 ANNUAL INDEX

## AUTHOR INDEX

- AANNSTAD, PER A. Interstellar Polarization, Grain Growth, and Alignment. *Per A. Aannestad and J. Mayo Greenberg*. **272**, 551, 107-G6 (1983)
- AARONSON, M. Photometric Studies of Composite Stellar Systems. V. Infrared Photometry of Star Clusters in the Magellanic Clouds. *S. E. Persson, M. Aaronson, Judith G. Cohen, Jay A. Frogel, and K. Matthews*. **266**, 105, 28-B2 (1983)
- AARONSON, MARC. A Distance Scale from the Infrared Magnitude/H 1 Velocity-Width Relation. IV. The Morphological Type Dependence and Scatter in the Relation; the Distances to Nearby Groups. *Marc Aaronson and Jeremy Mould*. **265**, 1, 12-A6 (1983)
- Accurate Radial Velocities for Carbon Stars in Draco and Ursa Minor: The First Hint of a Dwarf Spheroidal Mass-to-Light Ratio. *Marc Aaronson*. **266**, L11, 32-A12 (1983)
- Carbon Stars and the Seven Dwarfs. *Marc Aaronson, Edward W. Olszewski, and Paul W. Hodge*. **267**, 271, 42-G5 (1983)
- The Carina Dwarf Spheroidal—An Intermediate Age Galaxy. *Jeremy Mould and Marc Aaronson*. **273**, 530, 119-C14 (1983)
- Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. *John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson*. **274**, 125, 125-C5 (1983)
- ABRAMOPOULOS, FRANK. X-Ray Survey of Clusters of Galaxies with the Einstein Observatory. *Frank Abramopoulos and William H.-M. Ku*. **271**, 446, 94-C6 (1983)
- ABT, HELMUT A. Confirmation among Visual Multiples of an Increase of Ap Stars with Age. *Helmuth A. Abt and Octavio Cardona*. **272**, 182, 103-A8 (1983)
- HD 164615: A Probable Spotted Single F Type Star. *Helmuth A. Abt, Galen Bollinger, and Edward W. Burke, Jr.* **272**, 196, 103-B10 (1983)
- Editorial. *Helmuth A. Abt*. **273**, 1, 112-A6 (1983)
- ACTON, L. Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. *R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner*. **270**, 270, 79-G7 (1983)
- ADAMS, M. T. The Star-forming History of the Young Cluster NGC 2264. *M. T. Adams, K. M. Strom, and S. E. Strom*. **53**, 893, 29-A11 (1983) (Abstr. in **274**, 920, 135-E1)
- ADAMS, NIGEL G. Laboratory Measurements of Ion-Molecule Reactions Pertaining to Interstellar Hydrocarbon Synthesis. *Eric Herbst, Nigel G. Adams, and David Smith*. **269**, 329, 68-F12 (1983)
- Association Reactions of Na<sup>+</sup> and Some Implications for Interstellar Chemistry. *David Smith, Nigel G. Adams, Erich Alge, and Eric Herbst*. **272**, 365, 105-A6 (1983)
- ADE, P. A. R. Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low*. **273**, 58, 112-F10 (1983)
- ADELMAN, SAUL J. Spectrophotometry of B, A, and F Stars. III. *Saul J. Adelman and Diane M. Pyper*. **266**, 732, 36-C10 (1983)
- AFRICANO, JOHN L. Detection of Flarelike Events and Their Relationship to Presumed Spot Regions of V471 Tauri: A Solar-Stellar Connection. *Arthur Young, A. Klimke, John L. Africano, Rob Quigley, Richard R. Radick, and Dave Van Buren*. **267**, 655, 48-A3 (1983)
- Observations of Active Chromosphere Stars. *Bernard W. Bopp, John L. Africano, R. E. Stencel, P. V. Noah, and A. Klimke*. **275**, 691, 145-B2 (1983)
- AGGARWAL, K. M. Electron Excitation Rates Among Fine Structure Levels in O III. *K. M. Aggarwal*. **52**, 387, 15-F1 (1983) (Abstr. in **270**, 779, 86-E6)
- ÅGREN, HANS. A Theoretical Investigation of the Radiative Properties of the CN Red and Violet Systems. *Mats Larsson, Per E. M. Siegbahn, and Hans Ågren*. **272**, 369, 1005-A10 (1983)
- AGUILAR, LUIS A. Kinematics of the Optical Filaments in W50. *Tsevi Mazeh, Luis A. Aguilar, Richard R. Treffers, Arieh Königl, and Linda S. Sparke*. **265**, 235, 14-F5 (1983)
- A'HEARN, M. F. The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams*. **274**, 168, 125-F6 (1983)
- A'HEARN, MICHAEL F. The Discovery of S<sub>2</sub> in Comet Iras-Araki-Alcock 1983d. *Michael F. A'Hearn, Paul D. Feldman, and David G. Schleicher*. **274**, L99, 136-E2 (1983)
- AIKAWA, TOSHIKI. Temperature-Grid Coordinates for Treating Pulsations in the Hydrogen Ionization Zone. *Toshiki Aikawa and Norman R. Simon*. **273**, 346, 116-A11 (1983)
- AITKIN, D. K. The Unique Cometary Nebula Parsamian 13. *Martin Cohen, D. K. Aitkin, P. F. Roche, and P. M. Williams*. **273**, 624, 120-D2 (1983)
- AKE, T. B. The 1982 Ultraviolet Eclipse of the Symbiotic Binary AR Pavonis. *J. B. Hutchings, A. P. Cowley, T. B. Ake, and C. L. Imhoff*. **275**, 271, 140-A6 (1983)
- ALBERT, C. E. Neutral Interstellar Gas in the Lower Galactic Halo. *C. E. Albert*. **272**, 509, 107-C14 (1983)
- ALCAÍNO, GONZALO. A Search for Globular Clusters around the Edge-on Late-Type Spiral Galaxy NGC 253. *William Liller and Gonzalo Alcaíno*. **265**, 166, 13-G9 (1983)
- ALCAÍNO, GONZALO. A Search for Globular Clusters around the Edge-on Spiral Galaxy NGC 55. *William Liller and Gonzalo Alcaíno*. **264**, 53, 1-E2 (1983)
- A Search for OB Associations near Southern Long-Period Cepheids. II. CT Carinae, UU Muscae, VZ Puppis, SV Velorum, and EZ Velorum. *Sidney van den Bergh, P. Frank Younger, Elmar B. F. Brosterhus, and Gonzalo Alcaíno*. **53**, 765, 27-B1 (1983) (Abstr. in **274**, 921, 135-E2)
- ALEXANDER, DAVID R. Studies of Late-Type Dwarfs. V. Theoretical Models for Lower Main-Sequence Stars. *Don A. Vandenberg, F. D. A. Hartwick, P. Dawson, and David R. Alexander*. **266**, 747, 36-D12 (1983)
- Effect of Molecules and Grains on Rosseland Mean Opacities. *David R. Alexander, Hollis R. Johnson, and Roger L. Rypm. 272*, 773, 110-B11 (1983)



- ALEXANIAN, MOORAD. Superposition of Planckian Spectra and the Distortions of the Cosmic Microwave Background Radiation: Erratum. *Moorad Alexanian*. **271**, 415, 92-D11 (1983) (Orig. paper in **258**, 43, 72-E4)
- ALGE, ERICH. Association Reactions of  $\text{Na}^+$  and Some Implications for Interstellar Chemistry. *David Smith, Nigel G. Adams, Erich Alge, and Eric Herbst*. **272**, 365, 105-A6 (1983)
- ALLAART, MARC. 6 Centimeter Observations of Solar Bursts with 0.1 s Time Constant and Arcsec Resolution. *Arie Kattenberg and Marc Allaart*. **265**, 535, 17-G8 (1983)
- ALLAMANDOLA, L. J. Identification of the Emission Features near 3.5 Microns in the Pre-Main-Sequence Star HD 97048. *F. Baas, L. J. Allamandola, T. R. Geballe, S. E. Persson, and J. H. Lacy*. **265**, 290, 15-C8 (1983)
- ALLEN, D. A. Observations of Two Peculiar Emission Objects in the Large Magellanic Cloud. *M. Kafatos, A. G. Michalitsianos, D. A. Allen, and R. E. Stencel*. **275**, 584, 144-A1 (1983)
- ALLER, H. D. *see also* LAWRENCE, A., *et al.*
- ALLER, H. D. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fantl, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea*. **274**, 101, 125-A9 (1983)
- ALLER, HUGH D. Dramatic Variations in the Polarization of BL Lacertae: Shocks and Gas? *Hugh D. Aller, Phillip E. Hodge, and Margo F. Aller*. **274**, L19, 129-B3 (1983)
- ALLER, LAWRENCE H. IUE Observations of the Perplexing Bipolar Planetary Nebula NGC 2346. *Walter A. Feibelman and Lawrence H. Aller*. **270**, 150, 78-E6 (1983)
- A Spectroscopic Study of Some Planetary Nebulae in the Large Magellanic Cloud. *Lawrence H. Aller*. **273**, 590, 120-A8 (1983)
- Chemical Compositions of Planetary Nebulae. *Lawrence H. Aller and Stanley J. Czyzak*. **51**, 211, 4-D1 (1983) (Abstr. in **264**, 747, 10-D11)
- ALLER, M. F. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fantl, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea*. **274**, 101, 125-A9 (1983)
- ALLER, MARGO F. Dramatic Variations in the Polarization of BL Lacertae: Shocks and Gas? *Hugh D. Aller, Phillip E. Hodge, and Margo F. Aller*. **274**, L19, 129-B3 (1983)
- ALLOIN, DANIELLE. Study of the Close Environment of the Active Nucleus in NGC 1068 by Decomposition of [O III] and H $\beta$  Emission-Line Profiles. *Danielle Alloin, Didier Pelat, Alec Boksenberg, and Wallace L. W. Sargent*. **275**, 493, 142-G10 (1983)
- ALMEIDA, J. Isotopic Neon Cross Sections for a Study of Neutron Balance and Temperature during s-Process Nucleosynthesis. *J. Almeida and F. Käppeler*. **265**, 417, 16-E13 (1983)
- ALY, J.-J. Synchronization of Magnetic Stars in Binary Systems. *F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb*. **274**, L71, 136-B12 (1983)
- AMBASTHA, ASHOK. On the Global Density Waves in Self-gravitating Flat Disks. *Ashok Ambastha and Ram K. Varma*. **264**, 413, 6-G2 (1983)
- AMBRUSTER, C. H0547-14: X-Ray Flux from a Weak Gamma-Ray Burst? *C. Ambruster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman*. **269**, 779, 75-A6 (1983)
- AMJOT, C. Fourier Spectroscopy of the  $^{12}\text{C}_2$ ,  $^{13}\text{C}_2$ , and  $^{12}\text{C}^{13}\text{C}$  Swan Bands. *C. Amiot*. **52**, 329, 14-A2 (1983) (Abstr. in **269**, 808, 75-C7)
- AN, CHANG-HYUK. MHD Stability of Incompressible Coronal Loops with Radiative Energy Loss. *Chang-Hyuk An*. **264**, 302, 4-B7 (1983)
- Flare Loop Radiative Hydrodynamics. IV. Dynamic Evolution of Unstable Semiempirical Loop Models. *Chang-Hyuk An, Richard C. Canfield, George H. Fisher, and A. N. McClymont*. **267**, 421, 44-D5 (1983)
- ANDERSON, CHRISTOPHER M. Observational Studies of the Symbiotic Stars. II. Emission-Line Relative Intensity Variations in CI Cygni, BF Cygni, AX Persei, and V1016 Cygni. *Nancy A. Oliverson and Christopher M. Anderson*. **268**, 250, 54-F3 (1983)
- ANDERSON, LAWRENCE. Stellar Images Derived from Rotation Broadening: AW Ursae Majoris. *Lawrence Anderson, Darryl Stanford, and Douglas Leininger*. **270**, 200, 79-B3 (1983)
- ANDERSON, SCOTT. The Spatial Distribution of H II Regions in NGC 4321. *Scott Anderson, Paul Hodge, and Robert C. Kennicutt, Jr.*. **265**, 132, 13-E2 (1983)
- ANDERSON, SCOTT F. Narrow-Band Photometric Periods in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi*. **269**, 605, 73-A11 (1983)
- Precession Instability in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi*. **273**, 697, 121-C2 (1983)
- ANDREWS, M. D. High-Resolution Radio and X-Ray Observations of the Supernova Remnant W28. *M. D. Andrews, J. P. Basart, R. C. Lamb, and R. H. Becker*. **266**, 684, 35-F8 (1983)
- ANGEL, J. R. P. The Polarization of Seyfert Galaxies. *P. G. Martin, I. B. Thompson, J. Maza, and J. R. P. Angel*. **266**, 470, 33-D10 (1983)
- ANGERHOFER, P. E. The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35 c$ . *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming*. **273**, L65, 123-B3 (1983)
- ANTIOCHOS, SPIRO K. A Giant X-Ray Flare in the Hyades. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos*. **264**, L55, 11-B11 (1983)
- Coordinated Einstein and IUE Observations of a Disruptions Brusques Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana*. **267**, 280, 43-A1 (1983)
- A Giant X-Ray Flare in the Hyades: Erratum. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos*. **275**, L25, 141-G9 (1983) (Orig. paper in **264**, L55, 11-B11)
- ANTONUCCI, ROBERT R. J. Time Development of the Emission Lines and Continuum of NGC 4151. *Robert R. J. Antonucci*

- and Ross D. Cohen. **271**, 564, 95-E14 (1983)  
Evidence for a Highly Polarized Continuum in the Nucleus of NGC 1068. *Joseph S. Miller and Robert R. J. Antonucci.* **271**, L7, 93-A8 (1983)
- APJ STAFF. *The Astrophysical Journal Instructions to Authors.* *APJ Staff.* **270**, 1, 77-A6 (1983)
- APT, JEROME. Methane on Triton and Pluto: New CCD Spectra. *Jerome Apt, Nathaniel P. Carleton, and Craig D. Mackay.* **270**, 342, 80-E11 (1983)
- ARAKI, SUGURU. Relativistic Thermal Plasmas: Effects of Magnetic Fields. *Suguru Araki and Alan P. Lightman.* **269**, 49, 65-E2 (1983)
- ARELLANO FERRO, A. Period and Amplitude Variations of Polaris. *A. Arellano Ferro.* **274**, 755, 133-E12 (1983)
- ARIGO, RICHARD J. Evolutionary Effects of Helium Diffusion in Population II Stars. *Guy S. Stringfellow, Peter Bodenheimer, Peter D. Noerdlinger, and Richard J. Arigo.* **264**, 228, 3-C14 (1983)
- ARONS, JONATHAN. Accretion onto Magnetized Neutron Stars: X-Ray Pulsars with Intermediate Rotation Rates. *David J. Burnard, Susan M. Lea, and Jonathan Arons.* **266**, 175, 28-G10 (1983)  
Pair Creation above Pulsar Polar Caps: Geometrical Structure and Energetics of Slot Gaps. *Jonathan Arons.* **266**, 215, 29-C8 (1983)
- ARP, H. C. 1107+036: An Unusual QSO-Galaxy Pair. *H. S. Murdoch, R. W. Hunstead, H. C. Arp, J. J. Condon, J. C. Blades, and E. M. Burbidge.* **265**, 610, 19-C4 (1983)
- ARP, HALTON. Further Observations and Analysis of Quasars Near Companion Galaxies. *Halton Arp.* **271**, 479, 94-F5 (1983)  
Density of Quasars around Companion Galaxies: Addendum. *Halton Arp.* **271**, L41, 93-D2 (1983) (Orig. paper in **263**, L9, 136-D9)
- ARP, HALTON C. MCG 5-29-86: A Galaxy with a Prolate Central Bulge? *Ken-ichi Wakamatsu and Halton C. Arp.* **273**, 167, 114-A8 (1983)
- ASSÉO, E. Radiative or Two-Stream Instability as a Source for Pulsar Radio Emission. *E. Asséo, R. Pellat, and H. Sol.* **266**, 201, 29-B8 (1983)
- ATHAY, R. G. Fluid Motions in the Solar Chromosphere-Corona Transition Region. I. Line Widths and Doppler Shifts for C IV. *R. G. Athay, J. B. Gurman, W. Henze, and R. A. Shine.* **265**, 519, 17-F3 (1983)  
Fluid Motions in the Solar Chromosphere-Corona Transition Region. III. Active Region Flows from Wide Slit Dopplergrams. *R. G. Athay, J. B. Gurman, and W. Henze.* **269**, 706, 74-B9 (1983)  
Fluid Motions in the Solar Chromosphere-Corona Transition Region. IV. Mass Motions over Sunspot Umbrae. *J. B. Gurman and R. G. Athay.* **273**, 374, 116-C11 (1983)
- ATWOOD, BRUCE. Color-Magnitude Photometry of 47 Tucanae to  $M_V = +9$ . *William E. Harris, James E. Hesser, and Bruce Atwood.* **268**, L111, 64-A1 (1983)  
Outflow of Gas in the Seyfert I Galaxy Markarian 509. *M. M. Phillips, J. A. Baldwin, Bruce Atwood, and R. F. Carswell.* **274**, 558, 131-D1 (1983)
- AVNI, Y. The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger.* **266**, L73, 39-A4 (1983)  
Quasar Evolution: Not a Deficit at "Low" Redshifts. *Y. Avni and N. Schiller.* **267**, 1, 40-A6 (1983)  
X-Ray Studies of Quasars with the Einstein Observatory. III. The 3CR Sample. *H. Tananbaum, J. F. C. Wardle, G. Zamorani, and Y. Avni.* **268**, 60, 52-E9 (1983)  
Analysis of Complete Quasar Samples to Obtain Parameters of Luminosity and Evolution Functions. *H. L. Marshall, Y. Avni, H. Tananbaum, and G. Zamorani.* **269**, 35, 65-D2 (1983)
- AXFORD, W. I. On the Drift Mechanism for Energetic Charged Particles at Shocks. *G. M. Webb, W. I. Axford, and T. Terasawa.* **270**, 537, 84-A10 (1983)
- AYASLI, S. Discovery of 9.3 s X-Ray Pulsations from 2S 1553-542 and a Determination of the Orbit. *R. L. Kelley, S. Rappaport, and S. Ayasli.* **274**, 765, 133-F8 (1983)
- AYRES, THOMAS R. The Narrow Ultraviolet Emission Lines of the Red Dwarf AU Microscopii (dM1.6e). *Thomas R. Ayres, Kjell Eriksson, Jeffrey L. Linsky, and R. E. Stencel.* **270**, L17, 80-B4 (1983)  
Outer Atmospheres of Cool Stars. XIII. Capella at Critical Phases. *Thomas R. Ayres, Francis H. Schiffer III, and Jeffrey L. Linsky.* **272**, 223, 103-D9 (1983)  
Outer Atmospheres of Cool Stars. XV. High-Dispersion Ultraviolet Studies of Active Chromosphere G-K Dwarfs. *Thomas R. Ayres, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, and Alexander Brown.* **274**, 784, 134-A1 (1983)  
Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold.* **274**, 801, 134-B5 (1983)
- BAAN, WILLEM A. Neutral Hydrogen Absorption in the Quasar 3C 268.4: Possible Evidence for Galactic Halo Clouds. *Aubrey D. Haschick, Patrick C. Crane, and Willem A. Baan.* **269**, L43, 76-B3 (1983)
- BAAS, F. Identification of the Emission Features near 3.5 Microns in the Pre-Main-Sequence Star HD 97048. *F. Baas, L. J. Allamandola, T. R. Geballe, S. E. Persson, and J. H. Lacy.* **265**, 290, 15-C8 (1983)
- BACKER, D. C. Distance to the 1.5 Millisecond Pulsar and Other 4C 21.53 Objects. *Carl Heiles, Shrinivas R. Kulkarni, Mary A. Stevens, D. C. Backer, M. M. Davis, and W. M. Goss.* **273**, L75, 123-B11 (1983)
- BACKMAN, D. see LAWRENCE, A., et al.
- BACKUS, P. R. Further Observations of the Long-Period Binary Pulsar PSR 0820+02. *R. N. Manchester, Lynette M. Newton, D. J. Cooke, P. R. Backus, M. Damashek, J. H. Taylor, and J. J. Condon.* **268**, 832, 62-B14 (1983)
- BAHCALL, JOHN N. The Galactic Spheroid. *John N. Bahcall, Maarten Schmidt, and Raymond M. Soneira.* **265**, 730, 20-F6 (1983)  
The Ratio of the Unseen Halo Mass to the Luminous Disk Mass in NGC 891. *John N. Bahcall.* **267**, 52, 40-E7 (1983)  
Stellar Collapses in the Galaxy. *John N. Bahcall and Tsvi Piran.* **267**, L77, 51-A11 (1983)  
Binary-Single Star Scattering. I. Numerical Experiments for Equal Masses. *Piet Hut and John N. Bahcall.* **268**, 319, 55-D6 (1983)  
Some Constraints on the Color-Magnitude Diagram of Giants in the Galactic Spheroid. *John N. Bahcall, Raymond M. Soneira, Donald C. Morton, and K. P. Tritton.* **272**, 627, 108-E14 (1983)
- BAHCALL, NETA A. The Spatial Correlation Function of Rich Clusters of Galaxies. *Neta A. Bahcall and Raymond M. Soneira.* **270**, 20, 77-B13 (1983)
- BAI, T. First-Order Fermi Acceleration in Solar Flares as a Mechanism for the Second-Step Acceleration of Prompt Protons and Relativistic Electrons. *T. Bai, H. S. Hudson, R. M. Pelling, R. P. Lin, R. A. Schwartz, and T. T. von Rosenvinge.* **267**, 433, 44-E3 (1983)
- BAILYN, CHARLES D. Lambda Tauri: A Probe of Angular Momentum Loss in Algol Binaries. *Charles D. Bailyn and Peter P. Eggleton.* **274**, 763, 133-F6 (1983)
- BAITY, W. A. 2-165 keV Observations of Active Galaxies and the Diffuse Background. *R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson.* **269**, 423, 71-B2 (1983)
- BAJAJ, K. K. Effect of Screening Due to Free Mobile Charges

- on the Binding Energy of an  $H^-$  Ion. *Dwight E. Phelps and K. K. Bajaj*. **268**, 447, 56-F11 (1983)
- BALDWIN, J. A. Nearby Galaxies with Seyfert-like Nuclei. *M. M. Phillips, P. A. Charles, and J. A. Baldwin*. **266**, 485, 33-E11 (1983)
- Outflow of Gas in the Seyfert I Galaxy Markarian 509. *M. M. Phillips, J. A. Baldwin, Bruce Atwood, and R. F. Carswell*. **274**, 558, 131-D1 (1983)
- BALICK, BRUCE. Spectroscopy of the Fuzz Associated with Four Quasars. *Bruce Balick and T. M. Heckman*. **265**, L1, 18-D14 (1983)
- Spatially Extended Narrow Emission-Line Gas in the Seyfert Galaxy NGC 4151. *Timothy M. Heckman and Bruce Balick*. **268**, 102, 53-A9 (1983)
- Radio and Optical Observations of the Alleged Optical Jet in DA 240. *Wil van Breugel, Timothy Heckman, Alan Bridle, Harvey Butcher, Richard Strom, and Bruce Balick*. **275**, 61, 137-E11 (1983)
- BALIUNAS, S. L. Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. *M. Garcia, S. L. Baliunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson*. **267**, 291, 43-A13 (1983)
- Chromospheric and Coronal Emissions from the Giants in the Hyades. *S. L. Baliunas, L. Hartmann, and A. K. Dupree*. **271**, 672, 96-G4 (1983)
- BALIUNAS, SALLIE L. Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Baliunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning*. **275**, 752, 145-F7 (1983)
- BALLY, JOHN. Ionized Gas in Active Molecular Cloud Cores. *John Bally and Read Predmore*. **265**, 778, 21-C3 (1983)
- The High-Velocity Molecular Flows near Young Stellar Objects. *John Bally and Charles J. Lada*. **265**, 824, 21-F10 (1983)
- Atomic Hydrogen Associated with the High-Velocity Flow in NGC 2071. *John Bally and Antony A. Stark*. **266**, L61, 32-D13 (1983)
- Radio Images of the Bipolar H II Region S106. *John Bally, Ronald L. Snell, and Read Predmore*. **272**, 154, 102-F7 (1983)
- BALONEK, T. see LAWRENCE, A., et al.
- BALONEK, T. J. Opacity Effects at Radio Wavelengths in the Quasar 1308+326. *C. P. O'Dea, W. A. Dent, and T. J. Balonek*. **266**, L1, 32-A2 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. *R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek*. **268**, 68, 52-F3 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea*. **274**, 101, 125-A9 (1983)
- BALZANO, VICKI A. Star-Burst Galactic Nuclei. *Vicki A. Balzano*. **268**, 602, 59-E10 (1983)
- BANHATTI, D. G. The  $V/V_*$  Test in Hoyle-Narlikar Conformal Gravity. *V. K. Kulkarni and D. G. Banhatti*. **274**, 469, 130-C3 (1983)
- BANIA, T. M. NGC 315: High-Velocity H I in an Active Elliptical Galaxy? *L. L. Dressel, T. M. Bania, and M. M. Davis*. **266**, L97, 39-B12 (1983)
- BARBOSA, D. D. Coulomb Thermal Properties and Stability of the Io Plasma Torus. *D. D. Barbosa, F. V. Coroniti, and A. Eviatar*. **274**, 429, 128-D4 (1983)
- BARBOUR, M. S. Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. *J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radostitz, W. C. Priedhorsky, J. Terrell, and E. N. Walker*. **271**, L65, 100-B8 (1983)
- BARBOUR, MARK S. X Persei: Optical Polarization Variation on the 580 Day Binary-like Period. *James C. Kemp and Mark S. Barbour*. **264**, 237, 3-D9 (1983)
- Discovery of Eclipse Polarization in Algol. *James C. Kemp, Gary D. Henson, Mark S. Barbour, Daniel J. Kraus, and George W. Collins II*. **273**, L85, 123-C7 (1983)
- SS 433: Improved Evidence for a Persistent 160 Day Photometric Period. *Gary D. Henson, James C. Kemp, Mark S. Barbour, Daniel J. Kraus, Elia M. Leibowitz, and Tsevi Mazeh*. **275**, 247, 139-F10 (1983)
- BARDEN, SAMUEL C. Rotation among Orion Ic G Stars: Angular Momentum Loss Considerations in Pre-Main-Sequence Stars. *Myron A. Smith, Jacques M. Beckers, and Samuel C. Barden*. **271**, 237, 90-E11 (1983)
- BARGHOLTZ, CHR. The Rate of the  $^1\text{He}(p, e^+ \nu)^4\text{He}$  Reaction. *P. E. Tegnér and Chr. Bargholtz*. **272**, 311, 104-C13 (1983)
- BARKAT, Z. The Luminosity-Core Mass Relation: Why and How. *Y. Tuchman, A. Glasner, and Z. Barkat*. **268**, 356, 55-G1 (1983)
- BARKER, E. S. Lyman-Alpha Observations of Comets West 1976 VI and P/D'Arrest 1976 XI with *Copernicus*. *M. C. Festou, H. U. Keller, J.-L. Bertaux, and E. S. Barker*. **265**, 925, 23-A1 (1983)
- BARKER, TIMOTHY. The Ionization Structure of Planetary Nebulae. III. NGC 7009. *Timothy Barker*. **267**, 630, 47-F4 (1983)
- Sulfur Abundances in Three Halo Planetary Nebulae. *Timothy Barker*. **270**, 641, 85-B5 (1983)
- BARNES, AARON. Large-Amplitude Hydromagnetic Waves in Collisionless Relativistic Plasma: Exact Solution for the Fast-Mode Magnetoacoustic Wave. *Aaron Barnes*. **265**, 925, 23-A11 (1983)
- BARNES, PETER J. G296.05 - 0.50—A Large-Diameter Supernova Remnant. *J. L. Caswell and Peter J. Barnes*. **271**, L55, 100-A13 (1983)
- BARR, P. Episodic Mass Loss and Narrow Lines in Gamma Cassiopeiae and in Other Early-Type Stars. *H. F. Henrichs, G. Hammerschlag-Hensberge, I. D. Howarth, and P. Barr*. **268**, 807, 62-A1 (1983)
- BARRETT, J. CO Emission and the Optical Disk in the Giant Sc Galaxy M101. *P. M. Solomon, J. Barrett, D. B. Sanders, and R. de Zafra*. **266**, L103, 39-C3 (1983)
- BARTKO, FRANK. Redshifts of Groups and Clusters in the Rich Superclusters 1451+22 and 1615+43. *Robin Ciardullo, Holland Ford, Frank Bartko, and Richard Harms*. **273**, 24, 112-C10 (1983)
- BARTOE, J.-D. F. Chromospheric Jets: Possible Extreme-Ultraviolet Observations of Spicules. *K. P. Dere, J.-D. F. Bartoe, and G. E. Brueckner*. **267**, L65, 45-F10 (1983)
- High Resolution Telescope and Spectrograph Observations of Solar Fine Structure in the 1600 Å Region. *J. W. Cook, G. E. Brueckner, and J.-D. F. Bartoe*. **270**, L89, 87-E2 (1983)
- Observations of High-Energy Jets in the Corona above the Quiet Sun, the Heating of the Corona, and the Acceleration of the Solar Wind. *G. E. Brueckner and J.-D. F. Bartoe*.

- 272, 329, 104-E5 (1983)
- BARVAINIS, R.** The Polarization of Millimeter-Wave Emission Lines in Dense Interstellar Clouds. *P. G. Wannier, N. Z. Scoville, and R. Barvainis.* **267**, 126, 41-C11 (1983)
- BARVAINIS, R. E.** The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fantì, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wiśniewski.* **274**, 62, 124-E11 (1983)
- BASART, J. P.** High-Resolution Radio and X-Ray Observations of the Supernova Remnant W28. *M. D. Andrews, J. P. Basart, R. C. Lamb, and R. H. Becker.* **266**, 684, 35-F8 (1983)
- BASINSKA, E. M.** X-Ray Burst Observations of Serpens X-1. *M. Sztajno, E. M. Basinska, L. R. Cominsky, F. J. Marshall, and W. H. G. Lewin.* **267**, 713, 48-E7 (1983)
- BASRI, GIBOR S.** First Observations of Stellar Coronal Structure: The Coronae of AR Lacertae. *Frederick M. Walter, David M. Gibson, and Gibor S. Basri.* **267**, 665, 48-A13 (1983)
- BASTIEN, TIMOTHY S.** Radio Emission from AM Herculis: The Quiescent Component and an Outburst. *George A. Dulk, Timothy S. Bastien, and G. Channugam.* **273**, 249, 115-A7 (1983)
- BATES, D. R.** Radiative Association and the Synthesis of Long Carbon Chain Molecules in Interstellar Clouds. *D. R. Bates.* **267**, L121, 51-D10 (1983)
- Theory of Molecular Formation by Radiative Association in Interstellar Clouds. *D. R. Bates.* **270**, 564, 84-C9 (1983)
- BATTY, M. J.** The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin.* **269**, 375, 70-E2 (1983)
- BATTY, MICHAEL J.** VLBI Observations of the Nucleus of Centaurus A. *Robert A. Preston, Ann E. Wehrle, David L. Morabito, David L. Jauncey, Michael J. Batty, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **266**, L93, 39-B8 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. *Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Batty, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **268**, L23, 57-B13 (1983)
- BAUTZ, M.** High-Energy X-Ray Observations of Vela X-1. *M. Bautz, S. Howe, A. Gorecki, F. Lang, A. Levine, F. Primini, and W. H. G. Lewin.* **266**, 794, 37-A8 (1983)
- BAUTZ, M. W.** HEAO 1 High-Energy X-Ray Observations of Centaurus X-3. *S. K. Howe, F. A. Primini, M. W. Bautz, F. L. Lang, A. M. Levine, and W. H. G. Lewin.* **272**, 678, 109-B12 (1983)
- BEAN, A. J.** The Clustering of Galaxies in a Complete Redshift Survey. *T. Shanks, A. J. Bean, G. Efsthathiou, R. S. Ellis, R. Fong, and B. A. Peterson.* **274**, 529, 130-G8 (1983)
- BEAVERS, W. I.** HR 7578: A K Dwarf Double-lined Spectroscopic Binary with Peculiar Abundances. *Francis C. Fekel, Jr. and W. I. Beavers.* **267**, 682, 48-C2 (1983)
- BECHTOLD, J.** The X-Ray Morphology of Abell 1367. *J. Bechtold, W. Forman, R. Giacconi, C. Jones, J. Schwarz, W. Tucker, and L. Van Speybroeck.* **265**, 26, 12-C7 (1983)
- The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin.* **269**, 375, 70-E2 (1983)
- BECK, S. C.** The Spatial Distribution of Shocked Gas in the Orion Nebula. *S. C. Beck and S. Beckwith.* **271**, 175, 89-G9 (1983)
- BECKER, R. H.** High-Resolution Radio and X-Ray Observations of the Supernova Remnant W28. *M. D. Andrews, J. P. Basart, R. C. Lamb, and R. H. Becker.* **266**, 684, 35-F8 (1983)
- A Two-Component X-Ray Spectrum from SMC X-1. *F. E. Marshall, N. E. White, and R. H. Becker.* **266**, 814, 37-C4 (1983)
- G29.7-0.3: Another Supernova Remnant with an Identity Crisis. *R. H. Becker, D. J. Helfand, and A. E. Szymkowiak.* **268**, L93, 63-F9 (1983)
- Rapid X-Ray Variability from the Seyfert 1 Galaxy NGC 4051. *F. E. Marshall, S. S. Holt, R. F. Mushotzky, and R. H. Becker.* **269**, L31, 76-A7 (1983)
- BECKER, ROBERT H.** The Discovery of a Hot Stellar Wind. *Richard L. White and Robert H. Becker.* **272**, L19, 105-E12 (1983)
- BECKER, STEPHEN A.** A Comparison between Observed and Theoretical H-R Diagrams for the Young LMC Star Cluster NGC 1866. *Stephen A. Becker and Grant J. Mathews.* **270**, 155, 78-E12 (1983)
- BECKERS, J.** Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. *J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado.* **265**, 1066, 24-D5 (1983)
- BECKERS, JACQUES M.** Rotation among Orion Ic G Stars: Angular Momentum Loss Considerations in Pre-Main-Sequence Stars. *Myron A. Smith, Jacques M. Beckers, and Samuel C. Barden.* **271**, 237, 90-E11 (1983)
- BECKLIN, E. E.** Submillimeter Extensions of the Solar Limb Determined from Observations of the Total Eclipse of 1982 July 31. *C. Lindsey, E. E. Becklin, J. T. Jefferies, F. Q. Orrall, M. W. Werner, and Ian Gatley.* **264**, L25, 5-B9 (1983)
- A 10 Micron Survey of Star Formation in Galactic Nuclei: Virgo Spiral Galaxies. *N. Z. Scoville, E. E. Becklin, Judith S. Young, and R. W. Capps.* **271**, 512, 95-B3 (1983)
- The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams.* **274**, 168, 125-F6 (1983)
- BECKWITH, S.** Observations of the Extinction and Excitation of the Molecular Hydrogen Emission in Orion. *S. Beckwith, Neal J. Evans II, I. Gatley, G. Gull, and R. W. Russell.* **264**, 152, 2-E6 (1983)
- High-Velocity Outflow Sources in Molecular Clouds: The Case for Low-Mass Stars. *S. Beckwith, A. Natta, and E. E. Salpeter.* **267**, 596, 47-C12 (1983)
- The Spatial Distribution of Shocked Gas in the Orion Nebula. *S. C. Beck and S. Beckwith.* **271**, 175, 89-G9 (1983)
- Speckle Interferometry of IRC +10216 in the Fundamental Vibration-Rotation Lines of CO. *H. M. Dyck, S. Beckwith, and B. Zuckerman.* **271**, L79, 100-C7 (1983)
- BEERS, TIMOTHY C.** Galaxy Clusters with Multiple Components. II. Abell 115. *Timothy C. Beers, John P. Huchra, and Margaret J. Geller.* **264**, 356, 6-B12 (1983)
- The Cancer Cluster: An Unbound Collection of Groups. *Gregory D. Bothun, Margaret J. Geller, Timothy C. Beers, and John P. Huchra.* **268**, 47, 52-D10 (1983)
- The Environment of D and cD Galaxies. *Timothy C. Beers and Margaret J. Geller.* **274**, 491, 130-D11 (1983)
- BEGELMAN, MITCHELL C.** Compton Heated Winds and Coronae above Accretion Disks. I. Dynamics. *Mitchell C. Begelman, Christopher F. McKee, and Gregory A. Shields.* **271**, 70, 88-F9 (1983)
- Compton Heated Winds and Coronae above Accretion Disks. II. Radiative Transfer and Observable Consequences. *Mitchell C. Begelman and Christopher F. McKee.* **271**, 89,



- 89-A1 (1983)
- BEHRING, W. E. The Solar O III Spectrum. II. Longer Wavelengths, Line Widths, and the He II Lyman  $\alpha$  Radiation Field. *S. O. Kastner, W. E. Behring, and A. K. Bhatia*. **53**, 129, 18-C6 (1983) (Abstr. in **271**, 392, 99-B14)
- BEICHMAN, C. A. Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wootten, C. Masson, and M. A. Frerking*. **273**, 633, 120-D13 (1983)
- BELL, M. B. The Detection of Butadiynyl ( $C_4H$ ) in Absorption against Cassiopeia A. *M. B. Bell, P. A. Feldman, and H. E. Matthews*. **273**, L35, 117-D7 (1983)
- BELL, R. A. Spectroscopic Analysis of Dwarf and Subgiant Stars in 47 Tucanae. *R. A. Bell, James E. Hesser, and R. D. Cannon*. **269**, 580, 72-F13 (1983)
- BELVEDERE, G. Differential Rotation in F Stars: A Comparison between Theory and Observation. *G. Belvedere and L. Paternò*. **268**, 246, 54-E13 (1983)
- BENFORD, GREGORY. Turbulent Resistive Heating of Solar Coronal Arches. *Gregory Benford*. **269**, 690, 74-A5 (1983)
- BENNETT, C. L. 5 GHz Observations of Sources in the Arecibo 611 MHz Survey. *C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke*. **51**, 67, 2-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- 5 GHz Observations of Sources in the Arecibo 611 MHz Survey: Erratum. *C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke*. **52**, 182, 11-G4 (1983) (Orig. paper in **51**, 67, 2-A1)
- BENNETT, K. Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills*. **274**, 231, 126-C13 (1983)
- BENSON, J. Luminous Molecular Hydrogen Emission in the Galaxy System NGC 3690-IC 694. *J. Fischer, M. Simon, J. Benson, and P. M. Solomon*. **273**, L27, 117-C13 (1983)
- BENSON, JOHN M. VLBI Observations of the Radio Sources 0552+398 and 1848+283: Measurements of the Departure from Equipartition. *Steven R. Spangler, Robert L. Mutel, and John M. Benson*. **271**, 44, 88-D7 (1983)
- BENSON, P. J. Dense Cores in Dark Clouds. I. CO Observations and Column Densities of High-Extinction Regions. *P. C. Myers, Richard A. Linke, and P. J. Benson*. **264**, 517, 8-A1 (1983)
- Dense Cores in Dark Clouds. II.  $NH_3$  Observations and Star Formation. *P. C. Myers and P. J. Benson*. **266**, 309, 30-C10 (1983)
- Dense Cores in Dark Clouds. IV.  $HC_3N$  Observations. *P. J. Benson and P. C. Myers*. **270**, 589, 84-E6 (1983)
- BENZ, A. O. Radio Blips and Hard X-Rays in Solar Flares. *A. O. Benz, T. E. X. Bernold, and B. R. Dennis*. **271**, 355, 91-G6 (1983)
- BERG, CHRISTOPHE J. X-Ray Observations of 20 3CR Radio Galaxies and Their Environments. *Eric D. Feigelson and Christophe J. Berg*. **269**, 400, 70-G7 (1983)
- BERNARD, A. The Emission Spectrum of Yttrium Monoxide: New Rotational and Vibrational Results on the  $A^2\Pi-X^2\Sigma^+$  System. *A. Bernard and R. Gravina*. **52**, 443, 16-D1 (1983) (Abstr. in **270**, 780, 86-E7)
- BERNOLD, T. E. X. Radio Blips and Hard X-Rays in Solar Flares. *A. O. Benz, T. E. X. Bernold, and B. R. Dennis*. **271**, 355, 91-G6 (1983)
- BERNOLD, THOMAS E. X. The Fiber Fine Structure during Solar Type IV Radio Bursts: Observations and Theory of Radiation in Presence of Localized Whistler Turbulence. *Thomas E. X. Bernold and Rudolf A. Treumann*. **264**, 677, 9-F4 (1983)
- BERTAUX, J.-L. Lyman-Alpha Observations of Comets West 1976 VI and P/D'Arrest 1976 XI with Copernicus. *M. C. Festou, H. U. Keller, J.-L. Bertaux, and E. S. Barker*. **265**, 925, 23-A1 (1983)
- IUE Spectrum of the Io Torus: Identification of the  $^5S_{2,1} \rightarrow ^3P_{2,1}$  Transitions of S III. *H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou*. **275**, L19, 141-G4 (1983)
- BERTSCH, D. L. Measurements of Galactic Plane Gamma-Ray Emission in the Energy Range 10-80 MeV. *D. L. Bertsch and D. A. Kniffen*. **270**, 305, 80-C2 (1983)
- BERTSCHINGER, E. Cosmological Self-similar Shock Waves and Galaxy Formation. *E. Bertschinger*. **268**, 17, 52-B8 (1983)
- BESSELL, M. S. Long-Period Variables in the Galactic Bulge: Evidence for a Young Super-Metal-rich Population. *P. R. Wood and M. S. Bessell*. **265**, 748, 21-A1 (1983)
- Long-Period Variables in the Magellanic Clouds: Supergiants, AGB Stars, Supernova Precursors, Planetary Nebula Precursors, and Enrichment of the Interstellar Medium. *P. R. Wood, M. S. Bessell, and M. W. Fox*. **272**, 99, 102-B8 (1983)
- BHATIA, A. K. The Solar O III Spectrum. II. Longer Wavelengths, Line Widths, and the He II Lyman  $\alpha$  Radiation Field. *S. O. Kastner, W. E. Behring, and A. K. Bhatia*. **53**, 129, 18-C6 (1983) (Abstr. in **271**, 892, 99-B14)
- BHAVSAR, SUKETU P. A Catalog of Hierarchical Subclustering in the Turner-Gott Groups. *Suketu P. Bhavsar and Richard G. Piggott, Jr.*. **52**, 23, 9-C10 (1983) (Abstr. in **267**, 893, 50-E1)
- BICKNELL, G. V. Infrared Observations of the Jet in M87. *R. M. Smith, G. V. Bicknell, A. R. Hyland, and T. J. Jones*. **266**, 69, 27-F4 (1983)
- On Tidal Detonation of Stars by Massive Black Holes. *G. V. Bicknell and R. A. Gingold*. **273**, 749, 121-F13 (1983)
- BIEGING, J. H. The Distribution of 6 Centimeter  $H_2CO$  in Orion Molecular Cloud I. *K. J. Johnston, Patrick Palmer, T. L. Wilson, and J. H. Bieging*. **271**, L89, 100-D2 (1983)
- BIEGING, JOHN H. CN in Dark Clouds. *Ed Churchwell and John H. Bieging*. **265**, 216, 14-D14 (1983)
- BIÉMONT, E. A Redetermination of the Solar Abundance of Molybdenum. *E. Biémont, N. Grevesse, P. Hannafoord, R. M. Lowe, and W. Whaling*. **275**, 889, 147-C4 (1983)
- BIENIEK, R. J. Collisional Rates for Vibrational-Rotational Transitions in Circumstellar SiO Masers: Erratum. *R. J. Bieniek and S. Green*. **270**, L101, 87-F9 (1983) (Orig. paper in **265**, L29, 18-F12)
- BIENIEK, RONALD J. Collisional Rates for Vibrational-Rotational Transitions in Circumstellar SiO Masers. *Ronald J. Bieniek and Sheldon Green*. **265**, L29, 18-F12 (1983)
- BIERMANN, PETER. Detection of  $10^{10} M_\odot$  of Hot Gas in the Normal Elliptical Galaxy NGC 5846 with the Einstein Satellite. *Peter Biermann and Philipp P. Kronberg*. **268**, L69, 63-E1 (1983)
- BIGNAMI, G. F. An Identification for "Geminga" (2CG 195+04) 1E 0630+178: A Unique Object in the Error Box of the High-Energy Gamma-Ray Source. *G. F. Bignami, P. A. Caraveo, and R. C. Lamb*. **272**, L9, 105-D13 (1983)
- Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills*. **274**, 231, 126-C13 (1983)
- Gamma-Ray Observations toward NGC 1275, and the Origin of the Emission in the Infrared, X-Rays, and Gamma-Rays. *A. W. Strong and G. F. Bignami*. **274**, 549, 131-C6 (1983)
- BIGNELL, R. C. VLA Observations of the Luminous Supernova Remnant in NGC 4449. *R. C. Bignell and E. R. Seaquist*. **270**, 140, 78-D10 (1983)
- Magnetic Field Structure in the Gum Nebula Area. *J. P. Vallée and R. C. Bignell*. **272**, 131, 102-D12 (1983)
- VLA Radio Continuum Observations of the Edge-on Spiral



- Galaxy NGC 3079. *Nebojsa Duric, E. R. Seaquist, Patrick C. Crane, R. C. Bignell, and L. E. Davis.* **273**, L11, 117-B12 (1983)
- Linear Polarization Observations in Selected Celestial Zones: The Gum Nebula Area. *R. C. Bignell and J. P. Vallée.* **53**, 147, 18-D9 (1983) (Abstr. in **271**, 893, 99-C1)
- BINNS, W. R. Cosmic-Ray Abundances of Sn, Te, Xe, and Ba Nuclei Measured on HEAO 3. *W. R. Binns, R. K. Finkle, T. L. Garrard, M. H. Israel, J. Klarmann, K. E. Krombel, E. C. Stone, and C. J. Waddington.* **267**, L93, 51-B12 (1983)
- BINZEL, R. P. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski.* **274**, 62, 124-E11 (1983)
- BIRETTA, J. A. Observations of the M87 Jet at 15 GHz with 0".12 Resolution. *J. A. Biretta, Frazer N. Owen, and Philip E. Hardee.* **274**, L27, 129-B10 (1983)
- BJORAKER, GORDON L. The NH<sub>3</sub> Spectrum in Saturn's 5 Micron Window. *Uwe Fink, Harold P. Larson, Gordon L. Bjoraker, and James R. Johnson.* **268**, 880, 62-F5 (1983)
- BLACK, DAVID C. The Isotopic Composition of Solar-Flare Noble Gases. *David C. Black.* **266**, 889, 38-A12 (1983)
- BLACK, JOHN H. Interstellar C<sub>2</sub> Molecules in a Taurus Dark Cloud. *L. M. Hobbs, John H. Black, and Ewine F. van Dishoeck.* **271**, L95, 100-D7 (1983)
- BLADES, J. C. 1107+036: An Unusual QSO-Galaxy Pair. *H. S. Murdoch, R. W. Hunstead, H. C. Arp, J. J. Condon, J. C. Blades, and E. M. Burbidge.* **265**, 610, 19-C4 (1983)
- Interstellar Absorption Lines in the Spectrum of 3C 273. *D. G. York, C. C. Wu, S. Ratcliff, J. C. Blades, L. L. Cowie, and D. C. Morton.* **274**, 136, 125-D2 (1983)
- Abundances of Carbon-bearing Diatomic Molecules in Diffuse Interstellar Clouds. *R. L. Dickman, W. B. Somerville, D. C. B. Whittet, D. McNally, and J. C. Blades.* **53**, 55, 17-E2 (1983) (Abstr. in **271**, 891, 99-B13)
- BLADES, J. CHRIS. C IV Absorption in the High-Redshift BL Lac Object 0215+015. II. New Observations at 20 km s<sup>-1</sup> Resolution. *Max Pettini, Richard W. Hunstead, Hugh S. Murdoch, and J. Chris Blades.* **273**, 436, 118-C3 (1983)
- BLAIR, W. P. The Structure and Emission Spectrum of a Non-radiative Shock Wave in the Cygnus Loop. *J. C. Raymond, W. P. Blair, R. A. Fesen, and T. R. Gull.* **275**, 636, 144-E3 (1983)
- BLAIR, WILLIAM P. The Extraordinary Extragalactic Supernova Remnant in NGC 4449. II. X-Ray and Optical Investigations. *William P. Blair, Robert P. Kirshner, and P. Frank Winkler, Jr.* **272**, 84, 102-A3 (1983)
- Spectrophotometric Observations of Symbiotic Stars and Related Objects. *William P. Blair, Robert E. Stencel, Walter A. Feibelman, and Andrew G. Michalitsianos.* **53**, 573, 24-F7 (1983) (Abstr. in **273**, 839, 122-F9)
- BLAKE, GEOFFREY A. Laboratory Millimeter and Submillimeter Spectrum of HOC<sup>+</sup>. *Geoffrey A. Blake, Paul Helminger, Eric Herbst, and Frank C. De Lucia.* **264**, L69, 11-C12 (1983)
- First Detection of the Ground-State J<sub>K</sub> = 1<sub>0</sub>→0<sub>0</sub> Submillimeter Transition of Interstellar Ammonia. *Jocelyn Keene, Geoffrey A. Blake, and T. G. Phillips.* **271**, L27, 93-B13 (1983)
- BLANCO, V. M. Evidence for Two Discrete Epochs of Star Formation in the Large Magellanic Cloud. *Jay A. Frogel and V. M. Blanco.* **274**, L57, 136-A13 (1983)
- BLOEMEN, J. B. G. M. Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Bucheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills.* **274**, 231, 126-C13 (1983)
- BLOOMER, RAYMOND H., JR. Discovery of Eclipses in the X-Ray Source HD 155638. *Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry.* **270**, L79, 87-D8 (1983)
- BLOWS, G. High-Resolution Photography of the Solar Chromosphere. XVII. Geometry of H $\alpha$  Flare Loops Observed on the Disk. *R. E. Loughhead, Jia-Long Wang, and G. Blows.* **274**, 883, 135-A9 (1983)
- BOBROWSKY, M. Observations of H $\alpha$  and Microwave Brightening Caused by a Distant Solar Flare. *M. R. Kundu, D. M. Rust, and M. Bobrowsky.* **265**, 1084, 24-E9 (1983)
- BOCLET, D. Hard X-Ray Observations of the Crab Nebula and A0535+26 with a High Energy Resolution Spectrometer. *J. M. Hameury, D. Boclet, Ph. Durouchoux, T. L. Cline, W. S. Paciesas, B. J. Teegarden, J. Tueller, and R. C. Haymes.* **270**, 144, 78-D14 (1983)
- BODENHEIMER, PETER. Evolutionary Effects of Helium Diffusion in Population II Stars. *Guy S. Stringfellow, Peter Bodenheimer, Peter D. Noerdlinger, and Richard J. Arigo.* **264**, 228, 3-C14 (1983)
- A Two-dimensional Supernova Model with Rotation and Nuclear Burning. *Peter Bodenheimer and S. E. Woosley.* **269**, 281, 68-C3 (1983)
- BOGDAN, T. J. One-dimensional Periodic Flows with a Shock Transition: Application to the Density Wave Theory of Spiral Structure. *T. J. Bogdan.* **267**, 109, 41-B8 (1983)
- BOGGESE, ALBERT. Prominent Ultraviolet Emission Lines from Type I Seyfert Galaxies. *Chi-Chao Wu, Albert Boggess, and Theodore R. Gull.* **266**, 28, 27-C5 (1983)
- BOHLIN, R. C. Interstellar Abundances of Oxygen and Nitrogen. *D. G. York, L. Spitzer, R. C. Bohlin, J. Hill, E. B. Jenkins, B. D. Savage, and T. P. Snow.* **266**, L55, 32-D8 (1983)
- Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart.* **267**, L89, 51-B7 (1983)
- Images in the Rocket Ultraviolet: The Starburst in the Nucleus of M83. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, and T. P. Stecher.* **274**, L53, 136-A8 (1983)
- BOHLIN, RALPH C. The Diffuse Interstellar Feature at 4430 Å and Interstellar Extinction in the Far-Ultraviolet. *Adolf N. Witt, Ralph C. Bohlin, and Theodore P. Stecher.* **267**, L47, 45-E8 (1983)
- A Survey of Ultraviolet Interstellar Absorption Lines. *Ralph C. Bohlin, Jesse K. Hill, Edward B. Jenkins, Blair D. Savage, Theodore P. Snow, Jr., Lyman Spitzer, Jr., and Donald G. York.* **51**, 277, 6-B1 (1983) (Abstr. in **265**, 1135, 25-B11)
- BOHM-VITENSE, ERIKA. An Attempt to Determine Stellar Lyman-Alpha Emission-Line Fluxes for F Stars with Different Metal Abundances. *Erika Böhm-Vitense and Jack Woods.* **265**, 331, 15-F8 (1983)
- Einstein Observations of Three Classical Cepheids. *Erika Böhm-Vitense and Sidney B. Parsons.* **266**, 171, 28-G6 (1983)
- BOHN, COURTLANDT L. On the Equilibrium Configurations of Prolate, Axisymmetric Stellar Systems. *Courtlandt L. Bohn.* **268**, 646, 60-C4 (1983)
- BOISSON, C. The Ultraviolet Spectrum of the Seyfert Galaxies NGC 3516 and NGC 5548. *M. H. Ulrich and C. Boisson.* **267**, 515, 46-D13 (1983)
- BOK, BART J. Some Current Trends in Milky Way Research. *Bart J. Bok.* **273**, 411, 118-A5 (1983)
- BOKSENBURG, A. Optical and Radio Structure of the Quasar PKS 0812+02. *S. Wyckoff, K. Johnston, F. Ghigo, L. Rudnick, P. Wehinger, and A. Boksenberg.* **265**, 43, 12-E4 (1983)
- BOKSENBURG, ALEC. Study of the Close Environment of the Active Nucleus in NGC 1068 by Decomposition of [O III]

- and H $\beta$  Emission-Line Profiles. *Danielle Alloin, Didier Pelat, Alec Boksenberg, and Wallace L. W. Sargent*. **275**, 493, 142-G10 (1983)
- BOLAND, W. Detection of CH<sub>3</sub>OH  $J = 5-4$  Lines around 242 GHz from OMC-1. *W. Boland, Th. de Graauw, S. Lindholm, and T. J. Lee*. **271**, 183, 90-A4 (1983)
- BOLLINGER, GALEN. HD 164615: A Probable Spotted Single F Type Star. *Helmut A. Abt, Galen Bollinger, and Edward W. Burke, Jr.* **272**, 196, 103-B10 (1983)
- BOND, HOWARD E. The Precataclysmic Nucleus of Abell 41. *Albert D. Grauer and Howard E. Bond*. **271**, 259, 90-G5 (1983)
- Nickel Overabundances in Extremely Metal-deficient Red Giants. *R. Earle Luck and Howard E. Bond*. **271**, L75, 100-C3 (1983)
- BOND, J. R. The Collisionless Damping of Density Fluctuations in an Expanding Universe. *J. R. Bond and A. S. Szalay*. **274**, 443, 130-A5 (1983)
- BOOKBINDER, JAY. Bright, Rapid, Highly Polarized Radio Spikes from the M Dwarf AD Leonis. *Kenneth R. Lang, Jay Bookbinder, Leon Golub, and Michael M. Davis*. **272**, L15, 105-E8 (1983)
- BOOTH, R. S. VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young*. **272**, 383, 106-A5 (1983)
- BOPP, BERNARD W. An H $\alpha$  Survey of Southern Hemisphere Active Chromosphere Stars. *Bernard W. Bopp and J. B. Hearshaw*. **267**, 653, 48-A1 (1983)
- Observations of Active Chromosphere Stars. *Bernard W. Bopp, John L. Africano, R. E. Stencel, P. V. Noah, and A. Klimke*. **275**, 691, 145-B2 (1983)
- BORIAKOFF, V. An Attempt to Resolve Pulsar Magnetospheres Using Interstellar Scintillations. *J. M. Cordes, J. M. Weisberg, and V. Boriakoff*. **268**, 370, 56-A1 (1983)
- BORIAKOFF, VALENTIN. On the Radio Pulse Emission Mechanism of PSR 1133+16: Simultaneous Dual-Frequency High Time Resolution Observations. *Valentin Boriakoff*. **272**, 687, 109-C7 (1983)
- BORIS, J. P. Numerical Simulations of Loops Heated to Solar Flare Temperatures. I. Gasdynamics. *Chung-Chieh Cheng, E. S. Oran, G. A. Doschek, J. P. Boris, and J. T. Mariska*. **265**, 1090, 24-F4 (1983)
- Numerical Simulations of Loops Heated to Solar Flare Temperatures. II. X-Ray and UV Spectroscopy. *G. A. Doschek, Chung-Chieh Cheng, E. S. Oran, J. P. Boris, and J. T. Mariska*. **265**, 1103, 24-G3 (1983)
- BORIS, JAY P. Dynamics and Spectroscopy of Asymmetrical Heated Coronal Loops. *John T. Mariska and Jay P. Boris*. **267**, 404, 44-C7 (1983)
- BORNHANN, P. L. Coordinated Einstein and IUE Observations of a Disruptions *Brusques* Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana*. **267**, 280, 43-A1 (1983)
- BOROSON, TODD A. Luminosity Distributions for Virgo Cluster Galaxies. I. Near-Infrared Surface Photometry of 81 Disk Systems. *Todd A. Boroson, Karen M. Strom, and Stephen E. Strom*. **274**, 39, 124-D2 (1983)
- BORRA, ERMANNIO F. A Cosmological Test: Its Application to Quasars and Estimates of  $q_0$ . *Ermanno F. Borra*. **273**, L55, 123-A8 (1983)
- The Magnetic Fields of the Helium-weak B Stars. *Ermanno F. Borra, J. D. Landstreet, and Ian Thompson*. **53**, 151, 18-D13 (1983) (Abstr. in **271**, 894, 99-C2)
- BOTHUN, GREGORY D. H I Absorption in the Peculiar Galaxy NGC 6081. *Gregory D. Bothun and Robert A. Schommer*. **267**, L15, 45-C5 (1983)
- The Cancer Cluster: An Unbound Collection of Groups. *Gregory D. Bothun, Margaret J. Geller, Timothy C. Beers, and John P. Huchra*. **268**, 47, 52-D10 (1983)
- The Chemical Composition of Distant Globular Clusters: Are There Any Metal-poor Clusters? *Catherine A. Pilachowski, Gregory D. Bothun, Edward W. Olszewski, and Andrew Odell*. **273**, 187, 114-C5 (1983)
- BOUGHN, STEPHEN P. Infrared Photometry of the Halo of M87. *Stephen P. Boughn and Peter R. Saulson*. **265**, L55, 26-B12 (1983)
- BOWERS, P. F. The H I Content of Envelopes around Evolved Stars. *G. R. Knapp and P. F. Bowers*. **266**, 701, 36-A5 (1983)
- Circumstellar Envelope Structure of Late-Type Stars. *P. F. Bowers, K. J. Johnston, and J. H. Spencer*. **274**, 733, 133-D4 (1983)
- BOWERS, PHILLIP F. The Brighter 94 Micron Sources Observed by the Far-Infrared Sky Survey Experiment. *Stephan D. Price, K. Shivanandan, Thomas L. Murdock, and Phillip F. Bowers*. **275**, 125, 138-D8 (1983)
- BOWYER, C. S. HEAO A-2 Soft X-Ray Source Catalog. *J. J. Nugent, K. A. Jensen, J. A. Nousek, G. P. Garmire, K. O. Mason, F. M. Walter, C. S. Bowyer, R. A. Stern, and G. R. Riegler*. **51**, 1, 1-A2 (1983) (Abstr. in **263**, 1007, 142-F8)
- BOWYER, S. Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. *K. O. Mason, J. Middle-ditch, F. A. Córdova, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer*. **264**, 575, 8-E6 (1983)
- BOWYER, STUART. Time-resolved Spectrophotometry of the Emission Lines in the Galactic X-Ray Source H2252-035. *John T. Clarke, Keith O. Mason, and Stuart Bowyer*. **267**, 726, 48-F8 (1983)
- The Soft X-Ray Spectrum of the Vela Supernova Remnant. *Steven M. Kahn, Jean Brodie, Stuart Bowyer, and Philip A. Charles*. **269**, 212, 67-D12 (1983)
- X-Ray, Optical, and Radio Observations of the Blue Galaxy Butcher-Oemler 6 in the 3C 295 Cluster. *J. Patrick Henry, John T. Clarke, Stuart Bowyer, and Russell J. Lavery*. **272**, 434, 106-D14 (1983)
- The Discovery of Optical Emission Knots in the Inner Jet of Centaurus A. *Jean Brodie, Arie K. Königl, and Stuart Bowyer*. **273**, 154, 113-G7 (1983)
- BRACCESI, A. Optical and X-Ray Observations of Faint Quasars in an Optically Selected Sample. *H. L. Marshall, H. Tananbaum, G. Zamorani, J. P. Huchra, A. Braccesi, and V. Zitelli*. **269**, 42, 65-D9 (1983)
- BRADT, H. H0323+022: A Puzzling High-Latitude X-Ray/Optical/Radio Source. *R. Duxsey, H. Bradt, J. McClintock, L. Petro, R. Remillard, G. Ricker, D. Schwartz, and K. Wood*. **264**, L43, 11-A14 (1983)
- BRADT, HALE V. Candidates for a Gamma-Ray Burster Optical Counterpart. *Bradley E. Schaefer, Patrick Seitzer, and Hale V. Bradt*. **270**, L49, 87-B8 (1983)
- BRANCH, DAVID. The Type I Supernova 1981b in NGC 4536: The First 100 Days. *David Branch, C. H. Lacy, Marshall L. McCall, P. G. Sutherland, A. Uomoto, J. C. Wheeler, and B. J. Wills*. **270**, 123, 78-C9 (1983)
- BRANDT, JOHN C. The Effect of MHD Instabilities on the Flaring of Cometary Plasma Tails. *Malcolm B. Niedner, Jr., Alexander I. Ershkovich, and John C. Brandt*. **272**, 362, 105-A3 (1983)
- BRAULT, J. Solar Emission Lines near 12 Microns. *J. Brault and R. Noyes*. **269**, L61, 76-C5 (1983)
- BREGMAN, J. D. The C<sub>2</sub>H, C<sub>2</sub>, and CN Electronic Absorption Bands in the Carbon Star HD 19557. *J. H. Goebel, J. D. Bregman, D. M. Cooper, D. Goorvitch, S. R. Langhoff, and F. C. Witteborn*. **270**, 190, 79-A7 (1983)
- Observations of NGC 7027 from 5.2 to 7.5 Microns: The

- Detection of Ni II and Additional Dust Features. *J. D. Bregman, H. L. Dinerstein, J. H. Goebel, D. F. Lester, F. C. Witteborn, and D. M. Rank.* **274**, 666, 132-F7 (1983)
- BREGMAN, J. N. Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea.* **274**, 101, 125-A9 (1983)
- BREWSTER, N. R. The Propagation of Ultraheavy Cosmic Ray Nuclei. *N. R. Brewster, P. S. Freier, and C. J. Waddington.* **264**, 324, 4-D3 (1983)
- BRIDLE, ALAN. Radio and Optical Observations of the Alleged Optical Jet in DA 240. *Wil van Breugel, Timothy Heckman, Alan Bridle, Harvey Butcher, Richard Strom, and Bruce Balick.* **275**, 61, 137-E11 (1983)
- BRIEL, ULRICH G. Extended Soft X-Ray Emission from NGC 4151. *Martin Elvis, Ulrich G. Briel, and J. Patrick Henry.* **268**, 105, 53-A13 (1983)
- BRIIGS, F. H. Detection of 21 Centimeter Absorption at  $Z = 1.94$  in the QSO PKS 1157+014: Erratum. *A. M. Wolfe, F. H. Briggs, and D. L. Jauncey.* **267**, 891, 50-D13 (1983) (Orig. paper in **248**, 460, 86-F1)
- The Incidence of 21 Centimeter Absorption in QSO Redshift Systems Selected for Mg II Absorption: Evidence for a Two-Phase Nature of the Absorbing Gas. *F. H. Briggs and A. M. Wolfe.* **268**, 76, 52-F11 (1983)
- Test of a Class of Models for the Variable Absorption Lines in AO 0235+164. *F. H. Briggs.* **274**, 86, 124-G8 (1983)
- BRIOTTA, D. A., JR. Detection of Sulfur in the Galactic Center. *T. Herter, D. A. Briotta, Jr., G. E. Gull, M. A. Shure, and J. R. Houck.* **267**, L37, 45-D13 (1983)
- Determinations of S III, O IV, and Ne v Abundances in Planetary Nebulae from Infrared Lines. *M. A. Shure, T. Herter, J. R. Houck, D. A. Briotta, Jr., W. J. Forrest, G. E. Gull, and J. F. McCarthy.* **270**, 645, 85-B9 (1983)
- BRODIE, JEAN. The Soft X-Ray Spectrum of the Vela Supernova Remnant. *Steven M. Kahn, Jean Brodie, Stuart Bowyer, and Philip A. Charles.* **269**, 212, 67-D12 (1983)
- The Discovery of Optical Emission Knots in the Inner Jet of Centaurus A. *Jean Brodie, Arie König, and Stuart Bowyer.* **273**, 154, 113-G7 (1983)
- BROSTERHUS, ELMAR B. F. A Search for OB Associations near Southern Long-Period Cepheids. II. CT Carinae, UU Muscae, VZ Puppis, SV Velorum, and EZ Velorum. *Sidney van den Bergh, P. Frank Younger, Elmar B. F. Brosterhus, and Gonzalo Alcaíno.* **53**, 765, 27-B1 (1983) (Abstr. in **274**, 921, 135-E2)
- BROWN, ALEXANDER. Outer Atmospheres of Cool Stars. XV. High-Dispersion Ultraviolet Studies of Active Chromosphere G-K Dwarfs. *Thomas R. Ayres, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, and Alexander Brown.* **274**, 784, 134-A1 (1983)
- Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjørn Engvold.* **274**, 801, 134-B5 (1983)
- BROWN, J. M. The Microwave and Far-Infrared Spectra of the CH Radical. *J. M. Brown and K. M. Evenson.* **268**, L51, 57-D13 (1983)
- BROWN, JEFFERY A. Evidence of Non-LTE in Photospheric Lines of G and K Giants. *Jeffery A. Brown, Jocelyn Tomkin, and David L. Lambert.* **265**, L93, 26-E6 (1983)
- BROWN, L. W. An Extensive Galactic Search for Conformer II Glycine. *L. E. Snyder, J. M. Hollis, R. D. Suenram, F. J. Lovas, L. W. Brown, and D. Buhl.* **268**, 123, 53-C3 (1983)
- BROWN, R. D. Vibrationally Excited CH<sub>3</sub>CN and HC<sub>3</sub>N in Orion. *Paul F. Goldsmith, Robert Krotkov, Ronald L. Snell, R. D. Brown, and Peter Godfrey.* **274**, 184, 125-G8 (1983)
- BROWN, R. HAMILTON. The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams.* **274**, 168, 125-F6 (1983)
- BROWN, ROBERT A. A Deficiency of O III in the Io Plasma Torus. *Robert A. Brown, Donald E. Shemansky, and Robert E. Johnson.* **264**, 309, 4-B14 (1983)
- Observed Departure of the Io Plasma Torus from Rigid Co-rotation with Jupiter. *Robert A. Brown.* **268**, L47, 57-D9 (1983)
- BROWN, ROBERT L. 21 Centimeter H I Absorption at  $z = 0.437$  against the Extended Radio Structure of 3C 196. *Robert L. Brown and Kenneth J. Mitchell.* **264**, 87, 1-G7 (1983)
- The Relation between Magnetic Field and Gas Density in Interstellar Clouds. *Robert L. Brown and Chong-An Chang.* **264**, 134, 2-D2 (1983)
- The Gas Density and Distribution within 2 Parsecs of the Galactic Center. *Robert L. Brown and K. J. Johnston.* **268**, L85, 63-F1 (1983)
- The Discovery of an X-Ray Bright BL Lacertae Object: 0414+009. *M. P. Ulmer, Robert L. Brown, D. A. Schwartz, J. Patterson, and R. G. Cruddace.* **270**, L1, 81-A2 (1983)
- Radio Recombination Lines from Quasars. I. Level Populations of Hydrogenic Ions in a Strong, Nonthermal Radiation Field. *E. James Wadiak, Craig L. Sarazin, and Robert L. Brown.* **53**, 351, 21-E3 (1983) (Abstr. in **272**, 785, 110-C10)
- BROWNING, P. K. The Structure of Twisted Magnetic Flux Tubes. *P. K. Browning and E. R. Priest.* **266**, 848, 37-E11 (1983)
- BRUECKNER, G. E. Chromospheric Jets: Possible Extreme-Ultraviolet Observations of Spicules. *K. P. Dere, J.-D. F. Bartoe, and G. E. Brueckner.* **267**, L65, 45-F10 (1983)
- High Resolution Telescope and Spectrograph Observations of Solar Fine Structure in the 1600 Å Region. *J. W. Cook, G. E. Brueckner, and J.-D. F. Bartoe.* **270**, L89, 87-E2 (1983)
- Observations of High-Energy Jets in the Corona above the Quiet Sun, the Heating of the Corona, and the Acceleration of the Solar Wind. *G. E. Brueckner and J.-D. F. Bartoe.* **272**, 329, 104-E5 (1983)
- BRUHWEILER, FREDERICK C. Mass Loss, Levitation, Accretion, and the Sharp-Lined Features in Hot White Dwarfs. *Frederick C. Bruhweiler and Yoji Kondo.* **269**, 657, 73-E14 (1983)
- Sharp Shortward-shifted Features in the Spectra of O Subdwarfs. *Frederick C. Bruhweiler and Charles A. Dean.* **274**, L87, 136-D6 (1983)
- BRUNING, DAVID H. Interpretation of Solar Irradiance Variations Using Ground-based Observations. *David H. Bruning and Barry J. La Bonte.* **271**, 853, 98-F12 (1983)
- BRUZUAL A., GUSTAVO. Spectral Evolution of Galaxies. I. Early-Type Systems. *Gustavo Bruzual A.* **273**, 105, 113-C6 (1983)
- Spectral Evolution of Galaxies. III. Cosmological Predictions for the Space Telescope Faint Object Camera. *Gustavo Bruzual A.* **53**, 497, 23-E2 (1983) (Abstr. in **272**, 787, 110-C12)
- BUCCHERI, R. Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills.* **274**, 231, 126-C13 (1983)
- BUCKBY, M. A. Rates for Some Reactions in the Mass Range  $39 \leq A \leq 45$ . *M. A. Buckby and J. D. King.* **264**, 278, 3-G9 (1983)
- BUHL, D. An Extensive Galactic Search for Conformer II Glycine. *L. E. Snyder, J. M. Hollis, R. D. Suenram, F. J. Lovas, L. W. Brown, and D. Buhl.* **268**, 123, 53-C3 (1983)
- BURBIDGE, E. M. 1107+036: An Unusual QSO-Galaxy Pair. *H.*

- S. Murdoch, R. W. Hunstead, H. C. Arp, J. J. Condon, J. C. Blades, and E. M. Burbidge. **265**, 610, 19-C4 (1983)
- BURBIDGE, E. MARGARET. Spectrophotometry of the Broad Absorption-Line QSO PHL 5200. Vesa T. Junkkarinen, E. Margaret Burbidge, and Harding E. Smith. **265**, 51, 12-E13 (1983)
- BURGER, H. L. The Eddington Limit and Supercritical Accretion. II. Time-dependent Calculations. H. L. Burger and J. I. Katz. **265**, 393, 16-D3 (1983)
- BURKE, B. F. 5 GHz Observations of Sources in the Arecibo 611 MHz Survey. C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke. **51**, 67, 2-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- 5 GHz Observations of Sources in the Arecibo 611 MHz Survey: Erratum. C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke. **52**, 182, 11-G4 (1983) (Orig. paper in **51**, 67, 2-A1)
- BURKE, EDWARD W., JR. HD 164615: A Probable Spotted Single F Type Star. Helmut A. Abt, Galen Bollinger, and Edward W. Burke, Jr. **272**, 196, 103-B10 (1983)
- BURKE, JOHN R. The Gas-Grain Interaction in the Interstellar Medium: Thermal Accommodation and Trapping. John R. Burke and D. J. Hollenbach. **265**, 223, 14-E7 (1983)
- BURNARD, DAVID J. Accretion onto Magnetized Neutron Stars: X-Ray Pulsars with Intermediate Rotation Rates. David J. Burnard, Susan M. Lea, and Jonathan Arons. **266**, 175, 28-G10 (1983)
- BURNS, JACK O. cD Galaxy Dynamics and An Aged Ridge (Jet) in 3C 338. Jack O. Burns, Erik Schwendeman, and Richard A. White. **271**, 575, 95-G2 (1983)
- The Inner Radio Structure of Centaurus A: Clues to the Origin of the Jet X-Ray Emission. Jack O. Burns, Eric D. Feigelson, and Ethan J. Schreier. **273**, 128, 113-E6 (1983)
- BURNS, JOSEPH A. Preferred Orbit Planes in the Gravitational Field of a Tumbling Spheroidal Galaxy. Richard H. Durisen, Joel E. Tohline, Joseph A. Burns, and Anthony R. Dobrovolski. **264**, 392, 6-E9 (1983)
- BURNS, M. S. Infrared Study of the Crab Pulsar: The "Shoulder" Pulse and the 3.45 Micron Pulse Profile. J. Middleditch, C. Pennypacker, and M. S. Burns. **273**, 261, 115-B5 (1983)
- Infrared and Optical Pulsations from HZ Herculis and Possible 3.5 Second Infrared Pulsations from 1E 2259+586. J. Middleditch, C. R. Pennypacker, and M. S. Burns. **274**, 313, 127-B14 (1983)
- BURROWS, ADAM. The Effect of Trapped Lepton Number and Entropy on the Outcome of Stellar Collapse. Adam Burrows and James M. Lattimer. **270**, 735, 86-B3 (1983)
- BURROWS, D. N. The Soft X-Ray Diffuse Background. D. McCammon, D. N. Burrows, W. T. Sanders, and W. L. Kraushaar. **269**, 107, 66-B4 (1983)
- BURSTEIN, DAVID. A Simple Theory of How Spiral Galaxies Acquire Their Principal Global Properties. David Burstein and Craig L. Sarazin. **264**, 427, 7-A6 (1983)
- BUTA, R. Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups, Clusters, the Hercules Supercluster, and the Value of the Hubble Constant. R. Buta and G. de Vaucouleurs. **266**, 1, 27-A6 (1983)
- Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups, Clusters, the Hercules Supercluster, and the Value of the Hubble Constant: Erratum. R. Buta and G. de Vaucouleurs. **272**, 380, 105-B7 (1983) (Orig. paper in **266**, 1, 27-A6)
- Inner Ring Structures in Galaxies as Distance Indicators. III. Distances to 453 Spiral and Lenticular Galaxies. R. Buta and G. de Vaucouleurs. **51**, 149, 3-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- BUTCHER, H. Discovery of a Quasar with a Wide Angle Radio Tail in a Distant Cluster of Galaxies. D. E. Harris, P. E. Dewdney, C. H. Costain, H. Butcher, and A. G. Willis. **270**, 39, 77-D4 (1983)
- BUTCHER, HARVEY. Radio and Optical Observations of the Alleged Optical Jet in DA 240. Wil van Breugel, Timothy Heckman, Alan Bridle, Harvey Butcher, Richard Strom, and Bruce Balick. **275**, 61, 137-E11 (1983)
- The Evolution of Galaxies in Clusters. III. Photometry of 17 Intermediate Redshift Clusters. Harvey Butcher, Augustus Oemler, and Donald C. Wells. **52**, 183, 12-A2 (1983) (Abstr. in **269**, 809, 75-C8)
- BUTI, B. Dynamic Stabilization of Hydromagnetic Surface Waves: Applications to Cometary Plasma Tails. B. Buti. **268**, 420, 56-D11 (1983)
- BYRAM, E. T. H0547-14: X-Ray Flux from a Weak Gamma-Ray Burst? C. Ambruster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman. **269**, 779, 75-A6 (1983)
- BYRD, GENE G. Gravitationally Induced Spurs in Spiral Galaxies: An Example in M31. Gene G. Byrd. **264**, 464, 7-D4 (1983)
- BYRNE, P. B. Element Identifications in the Ultraviolet Spectrum of HD 101065. G. Wegner, D. J. Cummins, P. B. Byrne, and D. J. Stickland. **272**, 646, 108-G5 (1983)
- CACCIARI, C. Survey of H $\alpha$  Emission in Globular Cluster Red Giants. C. Cacciari and K. C. Freeman. **268**, 185, 54-A7 (1983)
- CAHN, J. H. Kinematics and Ages of Mira Variables in the Greater Solar Neighborhood. S. P. Wyatt and J. H. Cahn. **275**, 225, 139-E2 (1983)
- CALDWELL, NELSON. The Ages of the Disks of S0 Galaxies. Nelson Caldwell. **268**, 90, 52-G11 (1983)
- CALVET, NURIA. Stellar Winds and Molecular Clouds: T Tauri Stars. Nuria Calvet, Jorge Cantó, and L. F. Rodríguez. **268**, 739, 61-C3 (1983)
- CAMENZIND, M. A Wind and Shock Model for Active Galactic Nuclei. M. Camenzind and Thierry J.-L. Courvoisier. **266**, L83, 39-A13 (1983)
- CAMERON, A. G. W. Explosive Helium Burning in Supernovae: A Source of r-Process Elements. J. J. Cowan, A. G. W. Cameron, and J. W. Truran. **265**, 429, 16-F11 (1983)
- CAMPBELL, BEL. Infrared Spectroscopy of the Sources in S235 and Its Implication for the Line Excess Problem. Rodger I. Thompson, Harley A. Thronson, Jr., and Bel Campbell. **266**, 614, 35-A6 (1983)
- CAMPBELL, BELVA G. Speckle Interferometric Measurements of Binary Stars. VIII. Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, Belva G. Campbell, and Francis C. Fekel. **51**, 309, 6-F1 (1983) (Abstr. in **265**, 1135, 25-B11)
- Speckle Interferometric Measurements of Binary Stars. VIII. Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, and Belva G. Campbell. **53**, 241, 19-D4 (1983) (Orig. paper in **51**, 309, 6-F1)
- CAMPBELL, L. Quadrupole Moment of the Sun and the Planetary Orbits. L. Campbell and J. W. Moffat. **275**, L77, 148-E1 (1983)
- CANAL, R. Collapse and Explosion of White Dwarfs. I. Pre-collapse Evolution. J. Isern, J. Labay, M. Hernanz, and R. Canal. **273**, 320, 115-F8 (1983)
- CANFIELD, RICHARD C. Flare Loop Radiative Hydrodynamics. I. Basic Methods. A. N. McClymont and Richard C. Canfield. **265**, 483, 17-C9 (1983)
- Flare Loop Radiative Hydrodynamics. II. Thermal Stability of Empirical Models. A. N. McClymont and Richard C. Canfield. **265**, 497, 17-D9 (1983)
- Flare Loop Radiative Hydrodynamics. III. Nonlocal Radiative Transfer Effects. Richard C. Canfield, George H. Fisher, and A. N. McClymont. **265**, 507, 17-E5 (1983)
- Flare Loop Radiative Hydrodynamics. IV. Dynamic Evolution of Unstable Semiempirical Loop Models. Chang-Hyuk An, Richard C. Canfield, George H. Fisher, and A. N. McClymont. **267**, 421, 44-D5 (1983)



- A Static Model of Chromospheric Heating in Solar Flares. *Paul J. Ricchiazzi and Richard C. Canfield*. **272**, 739, 109-G5 (1983)
- CANIZARES, C. R. High-Velocity, Asymmetric Doppler Shifts of the X-Ray Emission Lines of Cassiopeia A. *T. H. Markert, C. R. Canizares, G. W. Clark, and P. F. Winkler*. **268**, 134, 53-D12 (1983)
- CANIZARES, CLAUDE R. Measurement of Coronal X-Ray Emission Lines from Capella. *Peter W. Vedder and Claude R. Canizares*. **270**, 666, 85-D2 (1983)
- The X-Ray Emitting Gas in Poor Clusters with Central Dominant Galaxies. *Gerard A. Kriss, Denis F. Cioffi, and Claude R. Canizares*. **272**, 439, 106-E7 (1983)
- Radiative Accretion of Intracuster Gas onto Dominant Galaxies in Poor Clusters. *Claude R. Canizares, Gordon C. Stewart, and Andrew C. Fabian*. **272**, 449, 106-F6 (1983)
- CANNON, R. D. Spectroscopic Analysis of Dwarf and Subgiant Stars in 47 Tucanae. *R. A. Bell, James E. Hesser, and R. D. Cannon*. **269**, 580, 72-F13 (1983)
- CANTÓ, JORGE. Stellar Winds and Molecular Clouds: T Tauri Stars. *Nuria Calvet, Jorge Cantó, and L. F. Rodríguez*. **268**, 739, 61-C3 (1983)
- Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? *José M. Torrelles, Luis F. Rodríguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho*. **274**, 214, 126-B10 (1983)
- CAPACCIOLI, M. Luminosity Distribution in Galaxies. II. A Study of Accidental and Systematic Errors with Application to NGC 3379. *M. Capaccioli and G. de Vaucouleurs*. **52**, 465, 16-E10 (1983) (Abstr. in **270**, 781, 86-E8)
- CAPPS, R. W. The Polarization of the Infrared Cluster in Orion: The Spatial Distribution of the 3.8 Micron Polarization. *Michael W. Werner, Harriet L. Dinerstein, and R. W. Capps*. **265**, L13, 18-E10 (1983)
- A 10 Micron Survey of Star Formation in Galactic Nuclei: Virgo Spiral Galaxies. *N. Z. Scoville, E. E. Becklin, Judith S. Young, and R. W. Capps*. **271**, 512, 95-B3 (1983)
- The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams*. **274**, 168, 125-F6 (1983)
- CARAVEO, P. A. An Identification for "Geminga" (2CG 195 + 04) 1E 0630 + 178: A Unique Object in the Error Box of the High-Energy Gamma-Ray Source. *G. F. Bignami, P. A. Caraveo, and R. C. Lamb*. **272**, L9, 105-D13 (1983)
- Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills*. **274**, 231, 126-C13 (1983)
- CARBON, DUANE F. Carbon and Nitrogen Abundances in Giant Stars of the Metal-poor Globular Cluster M15. *Charles F. Trefzger, Duane F. Carbon, G. E. Langer, Nicholas B. Suntzeff, and Robert P. Kraft*. **266**, 144, 28-E6 (1983)
- CARDONA, OCTAVIO. Confirmation among Visual Multiples of an Increase of Ap Stars with Age. *Helmut A. Abt and Octavio Cardona*. **272**, 182, 103-A8 (1983)
- CARGILL, P. J. The Heating of Postflare Loops. *P. J. Cargill and E. R. Priest*. **266**, 383, 31-B1 (1983)
- Magnetohydrodynamic Stability of Line-tied Coronal Arcades. I. Force-free Magnetic Fields without Embedded Prominences. *S. Migliuolo and P. J. Cargill*. **271**, 820, 98-D7 (1983)
- CARLETON, NATHANIEL P. Methane on Triton and Pluto: New CCD Spectra. *Jerome Apt, Nathaniel P. Carleton, and Craig D. Mackay*. **270**, 342, 80-E11 (1983)
- CARLSON, GEORGE. The Distance to M33 Based on a New Study of Its Cepheids. *Allan Sandage and George Carlson*. **267**, L25, 45-C14 (1983)
- CARNEVALI, P. The Long Term Evolution of Rotating Stellar Bars. *P. Carnevali*. **265**, 701, 20-D4 (1983)
- CARNEVALI, PAOLO. Dwarf Elliptical Galaxies. *Humberto Gerola, Paolo Carnevali, and E. E. Salpeter*. **268**, L75, 63-E6 (1983)
- CARNEY, BRUCE W. The Rotation of Horizontal-Branch Stars. I. Members of the Field. *Ruth C. Peterson, Theodore D. Tarbell, and Bruce W. Carney*. **265**, 972, 23-D6 (1983)
- CARPENTER, KENNETH G. Ultraviolet Spectroscopic Observations of Some Be Stars of Later Type and A-F Type Shell Stars. *Arne Slettebak and Kenneth G. Carpenter*. **53**, 869, 28-G1 (1983) (Abstr. in **274**, 923, 135-E4)
- CARR, B. J. Can Graininess in the Early Universe Make Galaxies? *B. J. Carr and Joseph Silk*. **268**, 1, 52-A6 (1983)
- CARRAL, PATRICIA. Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? *José M. Torrelles, Luis F. Rodríguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho*. **274**, 214, 126-B10 (1983)
- CARROLL, T. J. Broad-Line Kinematic Models and the Forbidden Line Emission in Quasars and Seyfert Galaxies. *T. J. Carroll and John Kwan*. **274**, 113, 125-B7 (1983)
- CARRUTHERS, GEORGE R. The S201 Far-Ultraviolet Imaging Survey. I. Two Fields at High Galactic Latitude. *George R. Carruthers and Thornton Page*. **53**, 623, 25-C1 (1983) (Abstr. in **273**, 841, 122-F11)
- CARSWELL, R. F. Outflow of Gas in the Seyfert 1 Galaxy Markarian 509. *M. M. Phillips, J. A. Baldwin, Bruce Atwood, and R. F. Carswell*. **274**, 558, 131-D1 (1983)
- CARTER, B. S. *see* LAWRENCE, A., *et al.*
- CARTER, D. A Catalog of Elliptical Galaxies with Shells. *D. F. Malin and D. Carter*. **274**, 534, 131-A1 (1983)
- CASH, WEBSTER, JR. Einstein Observations of X-Ray Emission from A Stars. *L. Golub, F. R. Harnden, Jr., C. W. Maxson, R. Rosner, G. S. Vaiana, Webster Cash, Jr., and Theodore P. Snow, Jr.* **271**, 264, 90-G11 (1983)
- CASSAR, L. Infrared Line and Radio Continuum Emission of Circumstellar Ionized Regions. *M. Simon, M. Felli, L. Cassar, J. Fischer, and M. Massi*. **266**, 623, 35-B1 (1983)
- CASSINELLI, JOSEPH P. Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. *Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers*. **268**, 205, 54-B14 (1983)
- X-Ray Spectra of Orion OB Supergiants. *Joseph P. Cassinelli and J. H. Swank*. **271**, 681, 97-A1 (1983)
- The Nature of R136a, the Superluminous Central Object of the 30 Doradus Nebula. *Blair D. Savage, Edward L. Fitzpatrick, Joseph P. Cassinelli, and Dennis C. Ebbets*. **273**, 597, 120-B1 (1983)
- CASTELAZ, M. The Stellar Component of the Galaxy as Seen by the AFGL Infrared Sky Survey. *Gary L. Grasdale, R. D. Gehrz, J. A. Hackwell, M. Castelaz, and C. Gullixson*. **53**, 413, 22-B7 (1983) (Abstr. in **272**, 787, 110-C12)
- CASTELLANI, V. On the Evolution of Massive Zero-Metal Stars. *V. Castellani, A. Chieffi, and A. Tornambé*. **272**, 249, 103-F7 (1983)
- CASTOR, JOHN I. Infrared Photometry of O Stars. *John I. Castor and Theodore Simon*. **265**, 304, 15-D9 (1983)
- Stellar Winds Driven by Multiline Scattering. *David B. Friend and John I. Castor*. **272**, 259, 103-G3 (1983)
- CASWELL, J. L. G296.05-0.50—A Large-Diameter Supernova Remnant. *J. L. Caswell and Peter J. Barnes*. **271**, L55, 100-A13 (1983)
- CATURA, R. C. Evidence for X-Ray Scattering by Interstellar Dust. *R. C. Catura*. **275**, 645, 144-E12 (1983)
- CAVALIERE, A. Quasar Evolution and Gravitational Collapse. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti*. **269**,



- 57, 65-E10 (1983)  
 Quasar Evolution and Gravitational Collapse: Erratum. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti*. **273**, 837, 122-F6 (1983) (Orig. paper in **269**, 57, 65-E10)
- CECCARELLI, C. The Irregular Distribution of Galaxies and the Anisotropies in the Microwave Background Photons. *C. Ceccarelli, F. Melchiorri, L. Pietranera, G. Dall'Oglio, and B. Melchiorri-Olivo*. **269**, L27, 76-A4 (1983)  
 Search for Extragalactic Backgrounds in the Far-Infrared. *C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera*. **275**, L39, 148-B7 (1983)
- CECIL, GERALD. Optical Spectrophotometry of the Nuclear Region of M51. II. Further Evidence for Nuclear Activity. *James A. Rose and Gerald Cecil*. **266**, 531, 34-B2 (1983)
- CENTRELLA, JOAN. Planar Numerical Cosmology. I. The Differential Equations. *Joan Centrella and James R. Wilson*. **273**, 428, 118-B9 (1983)
- CHACKERIAN, C., JR.  $^{12}\text{CH}_2\text{D}$  Rovibrational Intensities and the Jovian D/H Ratio. *C. Chackerian, Jr.* **273**, L47, 117-E3 (1983)
- CHAFFEE, F. H., JR. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fantì, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- CHAFFEE, FREDERIC H., JR. High-Resolution Spectroscopy of Selected Absorption Lines toward Quasi-stellar Objects. I. Lyman-Alpha toward PHL 957. *Frederic H. Chaffee, Jr., Ray J. Weymann, David W. Latham, and Peter A. Strittmatter*. **267**, 12, 40-B3 (1983)
- CHAMBE, G. Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. *J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado*. **265**, 1066, 24-D5 (1983)
- CHAMPAGNE, A. E. Nucleosynthesis of  $^{26}\text{Al}$  at Low Stellar Temperatures. *A. E. Champagne, A. J. Howard, and P. D. Parker*. **269**, 686, 74-A1 (1983)
- CHANAN, GARY A. Luminosity Correlations in Quasars. *Gary A. Chanan*. **275**, 45, 137-D9 (1983)
- CHANG, CHONG-AN. The Relation between Magnetic Field and Gas Density in Interstellar Clouds. *Robert L. Brown and Chong-An Chang*. **264**, 134, 2-D2 (1983)
- CHANG, E. S. Identification of the Solar Emission Lines near 12 Microns. *E. S. Chang and R. W. Noyes*. **275**, L11, 141-F11 (1983)
- CHANG, KAR MAN. Spectral and Temporal Effects of a Plasma Shell around an X-Ray Source. *Kar Man Chang and Nikolaos D. Kylafis*. **265**, 1005, 23-F11 (1983)
- CHANMUGAM, G. Radio Emission from AM Herculis: The Quiescent Component and an Outburst. *George A. Dulk, Timothy S. Bastien, and G. Channugam*. **273**, 249, 115-A7 (1983)
- CHAPMAN, G. A. Magnetohydrostatic Model of Solar Faculae. *Vladimir A. Osherovich, T. Flå, and G. A. Chapman*. **268**, 412, 56-D3 (1983)
- CHAPMAN, ROBERT D. The Partial Phase of the Eclipse of Epsilon Aurigae. *Robert D. Chapman, Yoji Kondo, and Robert E. Stencel*. **269**, L17, 69-B3 (1983)
- CHARLAND, YVES. Diffusion, Meridional Circulation, and Mass Loss in Fm-Am Stars. *Georges Michaud, David Tarasick, Yves Charland, and Claude Pelletier*. **269**, 239, 67-F14 (1983)
- CHARLES, P. A. Nearby Galaxies with Seyfert-like Nuclei. *M. M. Phillips, P. A. Charles, and J. A. Baldwin*. **266**, 485, 33-E11 (1983)
- CHARLES, PHILIP A. The Soft X-Ray Spectrum of the Vela Supernova Remnant. *Steven M. Kahn, Jean Brodie, Stuart Bowyer, and Philip A. Charles*. **269**, 212, 67-D12 (1983)
- CHENG, ANDREW F. X-Rays from Radio Pulsars: The Detection of PSR 1055-52. *Andrew F. Cheng and David J. Helfand*. **271**, 271, 91-A4 (1983)  
 X-Ray Emission from Radio Pulsar Winds. *Andrew F. Cheng*. **275**, 790, 146-B13 (1983)
- CHENG, CHUNG-CHIEH. Numerical Simulations of Loops Heated to Solar Flare Temperatures. I. Gasdynamics. *Chung-Chieh Cheng, E. S. Oran, G. A. Doschek, J. P. Boris, and J. T. Mariska*. **265**, 1090, 24-F4 (1983)  
 Numerical Simulations of Loops Heated to Solar Flare Temperatures. II. X-Ray and UV Spectroscopy. *G. A. Doschek, Chung-Chieh Cheng, E. S. Oran, J. P. Boris, and J. T. Mariska*. **265**, 1103, 24-G3 (1983)
- CHEVALIER, ROGER A. The Environments of T Tauri Stars. *Roger A. Chevalier*. **268**, 753, 61-D3 (1983)  
 Self-similar Solutions for the Interaction Regions of Colliding Winds. *Roger A. Chevalier and James N. Imamura*. **270**, 554, 84-B13 (1983)  
 Blast Waves with Cosmic-Ray Pressure. *Roger A. Chevalier*. **272**, 765, 110-B3 (1983)  
 A Comparison of Theoretical to Observed Type I Supernova Rates. *Glenn E. Miller and Roger A. Chevalier*. **274**, 840, 134-E2 (1983)  
 Winds in Elliptical Galaxies. *Raymond E. White III and Roger A. Chevalier*. **275**, 69, 137-F11 (1983)  
 X-Ray Line Emission from Supernova Remnants. I. Models for Adiabatic Remnants. *Andrew J. S. Hamilton, Craig L. Sarazin, and Roger A. Chevalier*. **51**, 115, 2-E1 (1983) (Abstr. in **263**, 1005, 142-F6)
- CHIAPPETTI, L. Ultraviolet Spectroscopy of V1341 Cygni (= Cygnus X-2). *L. Chiappetti, L. Maraschi, E. G. Tanzi, and A. Treves*. **265**, 354, 16-A5 (1983)  
 X-Ray and UV Observations of the BL Lacertae Object 3C 66A. *D. Maccagni, L. Maraschi, E. G. Tanzi, M. Tarengi, and L. Chiappetti*. **273**, 75, 113-A1 (1983)
- CHIEFFI, A. On the Evolution of Massive Zero-Metal Stars. *V. Castellani, A. Chieffi, and A. Tornambe*. **272**, 249, 103-F7 (1983)
- CHIN, CHAO-WEN. Possible Mechanisms for the Hubble-Sandage (S Doradus) Variables. *Richard Stothers and Chao-wen Chin*. **264**, 583, 8-F2 (1983)
- CHINCARINI, GUIDO L. Neutral Hydrogen in X-Ray Cluster Galaxies: A1367. *Guido L. Chincarini, R. Giovanelli, M. Haynes, and P. Fontanelli*. **267**, 511, 46-D9 (1983)  
 21 Centimeter Observations of Supercluster Galaxies: The Bridge between Coma and A1367. *Guido L. Chincarini, Riccardo Giovanelli, and Marita P. Haynes*. **269**, 13, 65-B4 (1983)
- CHLEWICKI, GRZEGORZ. A Far-Ultraviolet Extinction Law: What Does It Mean? *J. Mayo Greenberg and Grzegorz Chlewicki*. **272**, 563, 108-A6 (1983)
- CHRISTIAN, C. A. Spectrophotometry of M33 Clusters. *C. A. Christian and R. A. Schommer*. **275**, 92, 138-A11 (1983)
- CHU, Y.-H. Further Analysis of the Possible Effects of Isotope-selective Photodissociation on Interstellar Carbon Monoxide. *Y.-H. Chu and W. D. Watson*. **267**, 151, 41-E8 (1983)
- CHU, YAOQUAN. The Distribution of Quasars from a Small Area Survey. *Yaoquan Chu and Xingfen Zhu*. **267**, 4, 40-A9 (1983)  
 Does the Association of Quasars with Galaxies Depend on the Morphological Type of Galaxy? *Yaoquan Chu and Xingfen Zhu*. **271**, 507, 95-A12 (1983)
- CHU, YOU-HUA. Ring Nebulae Associated with Wolf-Rayet Stars in the Large Magellanic Cloud. III. Kinematics of DEM 39, 231, 240, and 315. *Yao-Hua Chu*. **269**, 202, 67-D1 (1983)  
 Galactic Ring Nebulae Associated with Wolf-Rayet Stars. VIII. Summary and Atlas. *Yao-Hua Chu, Richard R. Treffers, and*

- Karen B. Kwitter. **53**, 937, 29-F8 (1983) (Abstr. in **274**, 923, 135-E4)
- CHUBB, T. A. H0547-14: X-Ray Flux from a Weak Gamma-Ray Burst? *C. Ambruster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman.* **269**, 779, 75-A6 (1983)
- CHUPP, E. L. Gamma-Ray Observational Constraints on the Origin of the Optical Continuum Emission from the White-Light Flare of 1980 July 1. *J. M. Ryan, E. L. Chupp, D. J. Forrest, S. M. Matz, E. Rieger, C. Reppin, G. Kanbach, and G. H. Share.* **272**, L61, 111-B8 (1983)
- CHURCHWELL, E. Comparisons of C<sup>+</sup> Distributions with New Interstellar Sources of HCO Emission. *J. M. Hollis and E. Churchwell.* **271**, 170, 89-G4 (1983)
- The Kinetic Temperature and CH<sub>3</sub>CCH Column Density Profiles in Sgr B2, Orion, and DR 21. *E. Churchwell and J. M. Hollis.* **272**, 591, 108-C6 (1983)
- CHURCHWELL, ED. CN in Dark Clouds. *Ed Churchwell and John H. Bieging.* **265**, 216, 14-D14 (1983)
- CIARDULLO, ROBIN. Paired Quasars near NGC 2639: Evidence for Quasars in Superclusters? *Holland Ford, Robin Ciardullo, and Richard Harms.* **266**, 451, 33-C4 (1983)
- H $\alpha$  Observations of Four Novae in M31. *Robin Ciardullo, Holland Ford, and George Jacoby.* **272**, 92, 102-A11 (1983)
- Redshifts of Groups and Clusters in the Rich Superclusters 1451+22 and 1615+43. *Robin Ciardullo, Holland Ford, Frank Bartko, and Richard Harms.* **273**, 24, 112-C10 (1983)
- CIOFFI, DENIS F. The X-Ray Emitting Gas in Poor Clusters with Central Dominant Galaxies. *Gerard A. Kriss, Denis F. Cioffi, and Claude R. Canizares.* **272**, 439, 106-E7 (1983)
- CIUFOLINI, IGNAZIO. Equilibrium Configurations of Neutron Stars and the Parametrized Post-Newtonian Metric Theories of Gravitation. *Ignazio Ciufolini and Remo Ruffini.* **275**, 867, 147-A10 (1983)
- CLANCY, R. TODD. A Measurement of the <sup>12</sup>CO/<sup>13</sup>CO Ratio in the Mesosphere of Venus. *R. Todd Clancy and Duane O. Muhleman.* **273**, 829, 122-E11 (1983)
- CLANCY, SEAN P. Double-Mode RR Lyrae Variables in M15. *Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy.* **266**, 94, 28-A4 (1983)
- Theoretical Radial Pulsation Analyses of DA White Dwarfs. *Sumner Starrfield, Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy.* **269**, 645, 73-D14 (1983)
- CLARK, D. Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. *K. O. Mason, J. Middleditch, F. A. Cordova, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer.* **264**, 575, 8-E6 (1983)
- CLARK, DAVID H. MSH 15-52: A Supernova Remnant Containing Two Compact X-Ray Sources. *F. D. Seward, F. R. Harnden, Jr., P. Murdin, and David H. Clark.* **267**, 698, 48-D4 (1983)
- CLARK, G. W. High-Velocity, Asymmetric Doppler Shifts of the X-Ray Emission Lines of Cassiopeia A. *T. H. Markert, C. R. Canizares, G. W. Clark, and P. F. Winkler.* **268**, 134, 53-D12 (1983)
- Orbital Period Changes in Centaurus X-3. *R. L. Kelley, S. Rappaport, G. W. Clark, and L. D. Petro.* **268**, 790, 61-F12 (1983)
- CLARKE, JOHN T. Time-resolved Spectrophotometry of the Emission Lines in the Galactic X-Ray Source H2252-035. *John T. Clarke, Keith O. Mason, and Stuart Bowyer.* **267**, 726, 48-F8 (1983)
- Detection of Auroral Hydrogen Lyman-Alpha Emission from Uranus: Erratum. *John T. Clarke.* **269**, L25, 69-B9 (1983) (Orig. paper in **263**, L105, 143-E8)
- X-Ray, Optical, and Radio Observations of the Blue Galaxy Butcher-Oemler 6 in the 3C 295 Cluster. *J. Patrick Henry, John T. Clarke, Stuart Bowyer, and Russell J. Lavery.* **272**, 434, 106-D14 (1983)
- CLAYTON, DONALD D. Extinct Radioactivities: A Three-Phase Mixing Model. *Donald D. Clayton.* **268**, 381, 56-A12 (1983)
- Discovery of s-Process Nd in Allende Residue. *Donald D. Clayton.* **271**, L107, 100-E3 (1983)
- CLAYTON, GEOFFREY C. The Wavelength Dependence of Interstellar Polarization in the Large Magellanic Cloud. *Geoffrey C. Clayton, P. G. Martin, and Ian Thompson.* **265**, 194, 14-C3 (1983)
- CLEGG, P. E. Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low.* **273**, 58, 112-F10 (1983)
- CLEMENS, DAN P. Detection of J = 5-4 SiO Masers in Late-Type Stars. *Dan P. Clemens and Adair P. Lane.* **266**, L117, 39-D5 (1983)
- A Gravitationally Stable Bok Globule. *R. L. Dickman and Dan P. Clemens.* **271**, 143, 89-E1 (1983)
- CLINE, T. L. Hard X-Ray Observations of the Crab Nebula and A0535+26 with a High Energy Resolution Spectrometer. *J. M. Hameury, D. Boclet, Ph. Durouchoux, T. L. Cline, W. S. Paciesas, B. J. Teggarden, J. Tueller, and R. C. Haymes.* **270**, 144, 78-D14 (1983)
- CLIVER, E. W. Solar Proton Flares with Weak Impulsive Phases. *E. W. Cliver, S. W. Kahler, and P. S. McIntosh.* **264**, 699, 10-A2 (1983)
- COCHRAN, WILLIAM D. Desaturation of H<sub>2</sub> Quadrupole Lines in the Atmospheres of the Outer Planets. *William D. Cochran and Wm. Hayden Smith.* **271**, 859, 98-G6 (1983)
- COCKE, W. J. Redshift Quantization in Compact Groups of Galaxies. *W. J. Cocke and W. G. Tifft.* **268**, 56, 52-E5 (1983)
- COHEN, J. M. Hot Spots on Neutron Stars: The Near-Field Gravitational Lens. *K. R. Pechenick, C. Fiacas, and J. M. Cohen.* **274**, 846, 134-E8 (1983)
- COHEN, JUDITH G. Photometric Studies of Composite Stellar Systems. V. Infrared Photometry of Star Clusters in the Magellanic Clouds. *S. E. Persson, M. Aaronson, Judith G. Cohen, Jay A. Frogel, and K. Matthews.* **266**, 105, 28-B2 (1983)
- Nova Shells. *Judith G. Cohen and Ann J. Rosenthal.* **268**, 689, 60-F5 (1983)
- Abundances in Globular Cluster Red Giants. V. The Metal-rich Globular Clusters. *Judith G. Cohen.* **270**, 654, 85-C4 (1983)
- The Velocity Dispersion of the Globular Clusters in the Fornax Dwarf Galaxy. *Judith G. Cohen.* **270**, L41, 87-A12 (1983)
- Globular Cluster Giant Branches and the Metallicity Scale. *Jay A. Frogel, Judith G. Cohen, and S. E. Persson.* **275**, 773, 146-A9 (1983)
- Infrared Photometry, Bolometric Luminosities, and Effective Temperatures for Giant Stars in 26 Globular Clusters. *Jay A. Frogel, S. E. Persson, and Judith G. Cohen.* **53**, 713, 26-B9 (1983) (Abstr. in **273**, 841, 122-F11)
- COHEN, LEONARD. Lines of Fe XII Sensitive to Coronal Electron Density. *U. Feldman, Leonard Cohen, and G. A. Doschek.* **273**, 822, 122-E4 (1983)
- COHEN, M. H. Rectilinear Motions in 3C 345. *M. H. Cohen, S. C. Unwin, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker.* **269**, L1, 69-A3 (1983)
- Superluminal Motion in the Quasar 3C 345. *S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker.* **271**, 536, 95-C13 (1983)
- VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young.* **272**, 383, 106-A5 (1983)
- COHEN, MARTIN. The Exciting Stars of Herbig-Haro Objects. *Martin Cohen and Richard D. Schwartz.* **265**, 877, 22-C13 (1983)

- HL Tauri and Its Circumstellar Disk. *Martin Cohen*. **270**, L69, 87-C14 (1983)
- The Unique Cometary Nebula Parsamian 13. *Martin Cohen, D. K. Aitkin, P. F. Roche, and P. M. Williams*. **273**, 624, 120-D2 (1983)
- COHEN, N. L. Absence of Pulsar Ghost Remnants. *N. L. Cohen, W. D. Cotton, B. J. Geldzahler, and J. M. Marcaide*. **264**, 273, 3-G4 (1983)
- COHEN, ROSS D. Time Development of the Emission Lines and Continuum of NGC 4151. *Robert R. J. Antonucci and Ross D. Cohen*. **271**, 564, 95-E14 (1983)
- The Narrow-Line Region of Intermediate Seyfert Galaxies. *Ross D. Cohen*. **273**, 489, 119-A1 (1983)
- COHN, HALDAN. The Stability of a Magnetically Confined Radio Jet. *Haldan Cohn*. **269**, 500, 72-A1 (1983)
- COLE, PETER W. A Survey of the Core Helium Flash with Dynamic Convection. *Robert G. Deupree and Peter W. Cole*. **269**, 676, 73-G5 (1983)
- COLES, W. A. Spectral Broadening of Planetary Radar Signals by the Solar Wind. *J. K. Harmon and W. A. Coles*. **270**, 748, 86-C3 (1983)
- COLEY, A. A. Zero-Curvature Friedmann-Robertson-Walker Models as Exact Viscous Magnetohydrodynamic Cosmologies. *A. A. Coley and B. O. J. Tupper*. **271**, 1, 88-A6 (1983)
- COLLINS, GEORGE W., II. The Effects of Seeing on Spectral Line Measurements in Seyfert I Galaxies. *Bradley M. Peterson and George W. Collins II*. **270**, 71, 77-F8 (1983)
- Discovery of Eclipse Polarization in Algol. *James C. Kemp, Gary D. Henson, Mark S. Barbour, Daniel J. Kraus, and George W. Collins II*. **273**, L85, 123-C7 (1983)
- COMBI, M. R. Neutral Cometary Atmospheres. IV. Brightness Profiles in the Inner Coma of Comet Kahoutek 1973 XII. *A. H. Delsemme and M. R. Combi*. **271**, 388, 92-B12 (1983)
- COMINS, NEIL. Stochastic Self-propagating Star Formation in Three-dimensional Disk Galaxy Simulations. *Thomas Statter, Neil Comins, and Bruce F. Smith*. **270**, 79, 77-G3 (1983)
- COMINS, NEIL F. Three-Dimensional Computer Simulations of Star Formation in Dwarf Galaxies. *Neil F. Comins*. **266**, 543, 34-B14 (1983)
- Stellar Evolution in N-Body Simulations of Disk Galaxies. I. *Neil F. Comins*. **274**, 595, 132-A1 (1983)
- COMINSKY, L. See also LAWRENCE, A., et al.
- COMINSKY, L. Irregular X-Ray Variability in the Transient X-Ray Burst Source MXB 1659-29. *L. Cominsky, W. Ossman, and W. H. G. Lewin*. **270**, 226, 79-D1 (1983)
- Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. *A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsuoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs*. **271**, 793, 98-B8 (1983)
- COMINSKY, L. R. The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae). *G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen*. **266**, 806, 37-B10 (1983)
- X-Ray Burst Observations of Serpens X-1. *M. Sztajno, E. M. Basinska, L. R. Cominsky, F. J. Marshall, and W. H. G. Lewin*. **267**, 713, 48-E7 (1983)
- COMINSKY, LYNN R. Optical Radiation Associated with Gamma-Ray Bursts. *Richard A. London and Lynn R. Cominsky*. **275**, L59, 148-C14 (1983)
- CONDON, J. J. 1107+036: An Unusual QSO-Galaxy Pair. *H. S. Murdoch, R. W. Hunstead, H. C. Arp, J. J. Condon, J. C. Blades, and E. M. Burbidge*. **265**, 610, 19-C4 (1983)
- Further Observations of the Long-Period Binary Pulsar PSR 0820+02. *R. N. Manchester, Lynette M. Newton, D. J. Cooke, P. R. Backus, M. Damashek, J. H. Taylor, and J. J. Condon*. **268**, 832, 62-B14 (1983)
- Strong Radio Sources in Bright Spiral Galaxies. III. Disk Emission. *J. J. Condon*. **53**, 459, 23-A1 (1983) (Abstr. in **272**, 787, 110-C12)
- CONTI, G. Stellar Diameter Measurements by Two-Aperture Interferometry in the Infrared. *G. P. Di Benedetto and G. Conti*. **268**, 309, 55-C10 (1983)
- CONTI, PETER S. Wolf-Rayet Stars in the LMC: How Faint Are the Faintest? *Philip Massey and Peter S. Conti*. **264**, 126, 2-C8 (1983)
- The Spectra of Wolf-Rayet Stars. I. Optical Line Strengths and the Hydrogen-to-Helium Ratios in WN Type Stars. *Peter S. Conti, E. Mykky Leep, and Douglas N. Perry*. **268**, 228, 54-D9 (1983)
- Wolf-Rayet Stars in M33. *Philip Massey and Peter S. Conti*. **273**, 576, 119-G8 (1983)
- The Evolution of Massive Stars: The Numbers and Distribution of O Stars and Wolf-Rayet Stars. *Peter S. Conti, Catharine D. Garmany, C. de Loore, and D. Vanbeveren*. **274**, 302, 127-B3 (1983)
- CONTOPOULOS, G. Bifurcations, Gaps, and Stochasticity in Barred Galaxies. *G. Contopoulos*. **275**, 511, 143-B3 (1983)
- COOK, J. W. High Resolution Telescope and Spectrograph Observations of Solar Fine Structure in the 1600 Å Region. *J. W. Cook, G. E. Brueckner, and J.-D. F. Bartoe*. **270**, L89, 87-E2 (1983)
- COOK, M. C. Synchronization of Magnetic Stars in Binary Systems. *F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb*. **274**, L71, 136-B12 (1983)
- COOKE, D. J. Further Observations of the Long-Period Binary Pulsar PSR 0820+02. *R. N. Manchester, Lynette M. Newton, D. J. Cooke, P. R. Backus, M. Damashek, J. H. Taylor, and J. J. Condon*. **268**, 832, 62-B14 (1983)
- COOPER, D. M. The C<sub>2</sub>H, C<sub>2</sub>, and CN Electronic Absorption Bands in the Carbon Star HD 19557. *J. H. Goebel, J. D. Bregman, D. M. Cooper, D. Goorvitch, S. R. Langhoff, and F. C. Witteborn*. **270**, 190, 79-A7 (1983)
- COOPER, DAVID L. Ab Initio Spin-Orbit Coupling Constants for Potential Exotic Interstellar Molecules. *David L. Cooper*. **265**, 808, 21-E8 (1983)
- COPPI, BRUNO. Magnetic Reconnection Driven by Velocity Space Instabilities. *Bruno Coppi*. **273**, L101, 123-D8 (1983)
- CORDES, J. M. An Attempt to Resolve Pulsar Magnetospheres Using Interstellar Scintillations. *J. M. Cordes, J. M. Weisberg, and V. Boriakoff*. **268**, 370, 56-A1 (1983)
- CÓRDOVA, F. A. Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. *K. O. Mason, J. Middle-ditch, F. A. Córdoba, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer*. **264**, 575, 8-E6 (1983)
- CÓRDOVA, FRANCE A. Time-resolved Ultraviolet and Optical Spectroscopy of the Pulsating X-Ray Source H2252-035. *France A. Córdoba, E. E. Fenimore, John Middle-ditch, and Keith O. Mason*. **265**, 363, 16-B1 (1983)
- The Correlated X-Ray and Optical Time Variability of TT Arietis. *K. A. Jensen, France A. Córdoba, J. Middle-ditch, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer*. **270**, 211, 79-B14 (1983)
- CORNETT, R. H. Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart*. **267**, L89, 51-B7 (1983)
- Images in the Rocket Ultraviolet: The Starburst in the Nucleus of M83. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, and T. P. Stecher*. **274**, L53, 136-A8 (1983)
- CORONITI, F. V. Coulomb Thermal Properties and Stability of the Io Plasma Torus. *D. D. Barbosa, F. V. Coroniti, and A. Eviatar*. **274**, 429, 128-D4 (1983)
- COSTAIN, C. H. Discovery of a Quasar with a Wide Angle Radio Tail in a Distant Cluster of Galaxies. *D. E. Harris, P. E. Dewdney, C. H. Costain, H. Butcher, and A. G. Willis*. **270**, 39, 77-D4 (1983)
- COTTON, W. D. Absence of Pulsar Ghost Remnants. *N. L. Cohen*,

- W. D. Cotton, B. J. Geldzahler, and J. M. Marcaide. **264**, 273, 3-G4 (1983)  
 Radio Observations of Steep-Spectrum Compact Sources. W. D. Cotton. **271**, 51, 88-D14 (1983)
- COURVOISIER, THIERRY J.-L. A Wind and Shock Model for Active Galactic Nuclei. M. Camenzind and Thierry J.-L. Courvoisier. **266**, L83, 39-A13 (1983)
- COWAN, J. J. Explosive Helium Burning in Supernovae: A Source of *r*-Process Elements. J. J. Cowan, A. G. W. Cameron, and J. W. Truran. **265**, 429, 16-F11 (1983)
- COWAN, R. D. Inner-Shell Transitions in Fe XIX-XXII in the X-Ray Spectra of Solar Flares and Tokamaks. K. J. H. Phillips, J. R. Lemen, R. D. Cowan, G. A. Doschek, and J. W. Leibacher. **265**, 1120, 25-A10 (1983)
- COWAN, ROBERT D. Theoretical Oscillator Strengths for 21 Spin-forbidden Lines of C, N, O, Al, and Si: Erratum. Robert D. Cowan, L. M. Hobbs, and D. G. York. **265**, 582, 18-C13 (1983) (Orig. paper in **257**, 373, 65-A7)
- COWIE, L. L. On the Possibility of Detecting Very Hot Gas through Absorption-Line Studies. D. G. York and L. L. Cowie. **264**, 49, 1-D12 (1983)  
 Two-dimensional Spectrophotometry of the Cores of X-Ray Luminous Clusters. L. L. Cowie, E. M. Hu, E. B. Jenkins, and D. G. York. **272**, 29, 101-C6 (1983)  
 Interstellar Absorption Lines in the Spectrum of 3C 273. D. G. York, C. C. Wu, S. Ratcliff, J. C. Blades, L. L. Cowie, and D. C. Morton. **274**, 136, 125-D2 (1983)  
 The Filaments of NGC 1275: A Collision between a Galaxy and an Accretion Flow? E. M. Hu, L. L. Cowie, P. Kaaret, E. B. Jenkins, D. G. York, and F. L. Roesler. **275**, L27, 148-A4 (1983)
- COWLEY, A. P. Discovery of a Massive Unseen Star in LMC X-3. A. P. Cowley, D. Crampton, J. B. Hutchings, R. Remillard, and J. E. Penfold. **272**, 118, 102-C13 (1983)  
 A New Look at BE Ursae Majoris. D. Crampton, A. P. Cowley, and J. B. Hutchings. **272**, 202, 103-C2 (1983)  
 The 1982 Ultraviolet Eclipse of the Symbiotic Binary AR Pavonis. J. B. Hutchings, A. P. Cowley, T. B. Ake, and C. L. Imhoff. **275**, 271, 140-A6 (1983)  
 A Spectrographic Orbit for LMC X-1: Another Massive X-Ray Source? J. B. Hutchings, D. Crampton, and A. P. Cowley. **275**, L43, 148-B11 (1983)
- COX, ARTHUR N. Double-Mode RR Lyrae Variables in M15. Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy. **266**, 94, 28-A4 (1983)  
 The Discovery of Nonradial Instability Strips for Hot, Evolved Stars. Sumner G. Starrfield, Arthur N. Cox, Stephen W. Hodson, and W. D. Pesnell. **268**, L27, 57-C3 (1983)  
 Theoretical Radial Pulsation Analyses of DA White Dwarfs. Sumner Starrfield, Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy. **269**, 645, 73-D14 (1983)
- COX, DONALD P. Another Self-similar Blast Wave: Early Time Asymptote with Shock-heated Electrons and High Thermal Conductivity. Donald P. Cox and Richard J. Edgar. **265**, 443, 16-G11 (1983)  
 Self-regulating Star Formation: The Rate Limit Set by Ionizing Photons. Donald P. Cox. **265**, L61, 26-C4 (1983)  
 Self-regulated Star Formation in the Galaxy. José Franco and Donald P. Cox. **273**, 243, 115-A1 (1983)
- COX, J. P. Pulsations and Viscosity. J. P. Cox and B. L. Everson. **52**, 451, 16-D11 (1983) (Abstr. in **270**, 780, 86-E7)
- CRABTREE, DENNIS R. The Circumstellar Dust of Mu Cephei. C. Rogers, P. G. Martin, and Dennis R. Crabtree. **272**, 175, 103-A1 (1983)
- CRAM, L. E. Preliminary Observations of Velocity Fields at the Solar Poles. L. E. Cram, B. R. Durney, and D. B. Guenther. **267**, 442, 44-E13 (1983)  
 High Spatial and Temporal Resolution Observations of the Solar Ca II H Line. L. E. Cram and Luc Damé. **272**, 355, 104-G7 (1983)
- CRAMPTON, D. Discovery of a Massive Unseen Star in LMC X-3. A. P. Cowley, D. Crampton, J. B. Hutchings, R. Remillard, and J. E. Penfold. **272**, 118, 102-C13 (1983)  
 A New Look at BE Ursae Majoris. D. Crampton, A. P. Cowley, and J. B. Hutchings. **272**, 202, 103-C2 (1983)  
 A Spectrographic Orbit for LMC X-1: Another Massive X-Ray Source? J. B. Hutchings, D. Crampton, and A. P. Cowley. **275**, L43, 148-B11 (1983)
- CRANE, PATRICK C. Neutral Hydrogen Absorption in the Quasar 3C 268.4: Possible Evidence for Galactic Halo Clouds. Aubrey D. Haschick, Patrick C. Crane, and Willem A. Baan. **269**, L43, 76-B3 (1983)  
 VLA Radio Continuum Observations of the Edge-on Spiral Galaxy NGC 3079. Nebojsa Duric, E. R. Seaquist, Patrick C. Crane, R. C. Bignell, and L. E. Davis. **273**, L11, 117-B12 (1983)
- CRANE, PHILIPPE. Optical Emission in the Radio Lobes of Radio Galaxies. II. New Observations of 25 Radio Lobes. Philippe Crane, J. Anthony Tyson, and William C. Saslaw. **265**, 681, 20-B3 (1983)
- CRAVENS, T. E. Charge Exchange in Solar Wind-Cometary Interactions. T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy. **268**, 889, 62-G1 (1983)  
 Charge Exchange in Solar Wind-Cometary Interactions: Erratum. T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy. **274**, 919, 135-D14 (1983) (Orig. paper in **268**, 889, 63-A1)
- CRUDDACE, R. G. A Survey by HEAO 1 of Clusters of Galaxies. III. The Complete Abell Catalog. M. W. Johnson, R. G. Cruddace, M. P. Ulmer, M. P. Kowalski, and K. S. Wood. **266**, 425, 33-A5 (1983)  
 Redshift Modifications to HEAO A-1 Cluster X-Ray Luminosities. M. P. Kowalski, M. P. Ulmer, and R. G. Cruddace. **268**, 540, 59-A1 (1983)  
 The Discovery of an X-Ray Bright BL Lacertae Object: 0414+009. M. P. Ulmer, Robert L. Brown, D. A. Schwartz, J. Patterson, and R. G. Cruddace. **270**, L1, 81-A2 (1983)
- CRUTCHER, RICHARD M. Observations of Interstellar C<sub>2</sub> toward Three Heavily Reddened Stars. Barry L. Lutz and Richard M. Crutcher. **271**, L101, 100-D12 (1983)
- CUMMINS, D. J. Element Identifications in the Ultraviolet Spectrum of HD 101065. G. Wegner, D. J. Cummins, P. B. Byrne, and D. J. Stickland. **272**, 646, 108-G5 (1983)
- CUMMINS, SALLY E. The Kinetic Temperature and Density of the Sagittarius Molecular B2 Cloud from Observations of Methyl Cyanide. Sally E. Cummins, Sheldon Green, P. Thaddeus, and R. A. Linke. **266**, 331, 30-E4 (1983)
- CUPERMAN, SAMI. Theoretical Non-Maxwellian Particle Velocity Distribution Functions for Spherically Symmetric Solar Wind-like Plasma Systems and Consequences. Sami Cuperman, Itzhak Weiss, and Murray Dryer. **273**, 363, 116-B14 (1983)
- CZYŻAK, STANLEY J. Chemical Compositions of Planetary Nebulae. Lawrence H. Aller and Stanley J. Czyżak. **51**, 211, 4-D1 (1983) (Abstr. in **264**, 747, 10-D11)
- DA COSTA, G. S. Stellar Populations in Local Group Dwarf Elliptical Galaxies. I. NGC 147. J. R. Mould, Jerome Kristian, and G. S. Da Costa. **270**, 471, 83-C10 (1983)
- DAHARI, OVED. Spectra of Seyfert Galaxies and Seyfert Galaxy Candidates. Donald E. Osterbrock and Oved Dahari. **273**, 478, 118-F14 (1983)  
 Upper Limits to O III  $\lambda 5592$  and [Ni II]  $\lambda 5594$  in Seyfert Galaxies. Donald E. Osterbrock, Oved Dahari, and Jan Olof Ekberg. **273**, L31, 117-D3 (1983)
- DAHN, CONARD C. The Peculiar Cool White Dwarf LHS 1126: A Different Interpretation. James Liebert and Conard C. Dahn. **269**, 258, 68-A7 (1983)
- DALGARNO, A. Magnetohydrodynamic Shock Waves in Molec-



- ular Clouds. *B. T. Draine, W. G. Roberge, and A. Dalgarno.* **264**, 485, 7-E11 (1983)
- DALL'OGGIO, G. The Irregular Distribution of Galaxies and the Anisotropies in the Microwave Background Photons. *C. Ceccarelli, F. Melchiorri, L. Pietranera, G. Dall'Oglio, and B. Melchiorri-Olivo.* **269**, L27, 76-A4 (1983)
- Search for Extragalactic Backgrounds in the Far-Infrared. *C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera.* **275**, L39, 148-B7 (1983)
- DAMASHEK, M. Further Observations of the Long-Period Binary Pulsar PSR 0820+02. *R. N. Manchester, Lynette M. Newton, D. J. Cooke, P. R. Backus, M. Damashek, J. H. Taylor, and J. J. Condon.* **268**, 832, 62-B14 (1983)
- DAMÉ, LUC. High Spatial and Temporal Resolution Observations of the Solar Ca II H Line. *L. E. Cram and Luc Damé.* **272**, 355, 104-G7 (1983)
- DAME, T. M. A Large Molecular Cloud toward the SNR W50 and SS 433. *Y.-L. Huang, T. M. Dame, and P. Thaddeus.* **272**, 609, 108-D10 (1983)
- DANIELSON, G. E. Distribution of Forbidden Neutral Carbon Emission in the Ring Nebula (NGC 6720). *D. C. Jewitt, P. N. Kufperman, G. E. Danielson, and S. P. Maran.* **268**, 683, 60-E13 (1983)
- Photometry of Resolved Galaxies. III. GR 8. *J. G. Hoessel and G. E. Danielson.* **271**, 65, 88-E14 (1983)
- Photometry of Resolved Galaxies. II. Sextans A. *J. G. Hoessel, R. A. Schommer, and G. E. Danielson.* **274**, 577, 131-E8 (1983)
- DANKS, A. C. High-Resolution Spectra of C<sub>2</sub> Swan Bands from Comet West 1976 VI. *David L. Lambert and A. C. Danks.* **268**, 428, 56-E5 (1983)
- DANZIGER, I. J. The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. *John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Maccacaro, I. J. Danziger, D. Kunth, and J. Lub.* **273**, 458, 118-D12 (1983)
- DANZIGER, J. The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger.* **266**, L73, 39-A4 (1983)
- Optical Candidates for the 1978 November 19 Gamma-Ray Burst Source. *H. Pedersen, C. Motch, M. Tarengi, J. Danziger, G. Pizzichini, and W. H. G. Lewin.* **270**, L43, 87-A14 (1983)
- DANZIGER, JOHN. The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin.* **269**, 375, 70-E2 (1983)
- DARBRO, W. On Searches for Pulsed Emission with Application to Four Globular Cluster X-Ray Sources: NGC 1851, 6441, 6624, and 6712. *D. A. Leahy, W. Darbro, R. F. Elsner, M. C. Weisskopf, P. G. Sutherland, S. Kahn, and J. E. Grindlay.* **266**, 160, 28-F9 (1983)
- X-Ray Observations of 4U 1626-67 by the Monitor Counter on the Einstein (HEAO 2) Observatory. *R. F. Elsner, W. Darbro, D. Leahy, M. C. Weisskopf, P. G. Sutherland, S. M. Kahn, and J. E. Grindlay.* **266**, 769, 36-F6 (1983)
- The Period History of the X-Ray Pulsar in MSH 15-52. *M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Narayan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward.* **267**, 711, 48-E5 (1983)
- DARBRO, W. D. X-Ray Observations of LMC X-3 with the Monitor Proportional Counter aboard the HEAO 2 Einstein Observatory: A Comparison with Cygnus X-1. *M. C. Weisskopf, S. M. Kahn, W. D. Darbro, R. F. Elsner, J. E. Grindlay, S. Narayan, P. G. Sutherland, and A. C. Williams.* **274**, L65, 136-B7 (1983)
- DAS, ANIRUDDHA. VLA Observations of Warm NH<sub>3</sub> Associated with Mass Outflows in W51. *Paul T. P. Ho, Reinhard Genzel, and Aniruddha Das.* **266**, 596, 34-F14 (1983)
- DASHIDO, T. see LAWRENCE, A., et al.
- DAUGHERTY, JOSEPH K. Pair Production in Superstrong Magnetic Fields. *Joseph K. Daugherty and Alice K. Harding.* **273**, 761, 121-G11 (1983)
- DAVIDSON, J. A. Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. *Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic.* **274**, L43, 129-D3 (1983)
- DAVIES, ROGER L. The Kinematic Properties of Faint Elliptical Galaxies. *Roger L. Davies, George Efsthathiou, S. Michael Fall, Garth Illingworth, and Paul L. Schechter.* **266**, 41, 27-D4 (1983)
- Dynamics of Yet More Ellipticals and Bulges. *Roger L. Davies and Garth Illingworth.* **266**, 516, 34-A1 (1983)
- DAVIS, CECIL G. The Light and Velocity Curves of Classical Cepheids: Theory versus Observation. *Norman R. Simon and Cecil G. Davis.* **266**, 787, 37-A1 (1983)
- DAVIS, L. E. VLA Radio Continuum Observations of the Edge-on Spiral Galaxy NGC 3079. *Nebojsa Duric, E. R. Seaquist, Patrick C. Crane, R. C. Bignell, and L. E. Davis.* **273**, L11, 117-B12 (1983)
- VLA Continuum and OH Line Emission Observations of the Compact Nebula VY2-2. *E. R. Seaquist and L. E. Davis.* **274**, 659, 132-E14 (1983)
- DAVIS, LINDSEY ELSPETH. A 21 Centimeter Line Survey of a Complete Sample of Interacting and Isolated Galaxies. *Lindsey Elspeth Davis and E. R. Seaquist.* **53**, 269, 20-C2 (1983) (Abstr. in **272**, 785, 110-C10)
- DAVIS, M. M. NGC 315: High-Velocity H I in an Active Elliptical Galaxy? *L. L. Dressel, T. M. Bania, and M. M. Davis.* **266**, L97, 39-B12 (1983)
- Distance to the 1.5 Millisecond Pulsar and Other 4C 21.53 Objects. *Carl Heiles, Shrinivas R. Kulkarni, Mary A. Stevens, D. C. Backer, M. M. Davis, and W. M. Goss.* **273**, L75, 123-B11 (1983)
- DAVIS, MARC. A Survey of Galaxy Redshifts. V. The Two-Point Position and Velocity Correlations. *Marc Davis and P. J. E. Peebles.* **267**, 465, 46-A5 (1983)
- Nonlinear Evolution of Large-Scale Structure in the Universe. *Carlos S. Frenk, Simon D. White, and Marc Davis.* **271**, 417, 94-A5 (1983)
- Clustering in a Neutrino-dominated Universe. *Simon D. M. White, Carlos S. Frenk, and Marc Davis.* **274**, L1, 129-A2 (1983)
- A Survey of Galaxy Redshifts. IV. The Data. *John Huchra, Marc Davis, David Latham, and John Tonry.* **52**, 39, 10-D11 (1983) (Abstr. in **268**, 906, 63-A9)
- DAVIS, MICHAEL M. Bright, Rapid, Highly Polarized Radio Spikes from the M Dwarf AD Leonis. *Kenneth R. Lang, Jay Bookbinder, Leon Golub, and Michael M. Davis.* **272**, L15, 105-E8 (1983)
- DAVIS, R. Constraints on the Inclination and Masses of the HDE 226868/Cygnus X-1 System from the Observations. *R. Davis and L. Hartmann.* **270**, 671, 85-D7 (1983)
- DAVOUST, E. Felicity Fields in Late-Type Galaxies from H $\alpha$  Fabry-Perot Interferometry. IV. Kinematics and Dynamics of the SAB(s)c Spiral NGC 5236 (M83). *G. de Vaucouleurs, W. D. Pence, and E. Davoust.* **53**, 17, 17-B6 (1983) (Abstr. in **271**, 889, 99-B11)
- DAWSON, D. W. A Catalog of Spectral Classification and Photometry of Barium Stars. *P. K. Lü, D. W. Dawson, A. R. Upgren, and E. W. Weis.* **52**, 169, 11-E11 (1983) (Abstr. in **268**, 905, 63-A8)



- DAWSON, P. Studies of Late-Type Dwarfs. V. Theoretical Models for Lower Main-Sequence Stars. *Don A. Vandenberg, F. D. A. Hartwick, P. Dawson, and David R. Alexander.* **266**, 747, 36-D12 (1983)
- DEAN, CHARLES A. Sharp Shortward-shifted Features in the Spectra of O Subdwarfs. *Frederick C. Bruhweiler and Charles A. Dean.* **274**, L87, 136-D6 (1983)
- DE BERGH, C. Monodeuterated Methane in the Outer Solar System. I. Spectroscopic Analysis of the Bands at 1.55 and 1.95 Microns. *Barry L. Lutz, C. de Bergh, and J. P. Maillard.* **273**, 397, 116-E7 (1983)
- DE BERNARDIS, P. Search for Extragalactic Backgrounds in the Far-Infrared. *C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera.* **275**, L39, 148-B7 (1983)
- DE BOER, KLAAS S. Absorption of Halo Gas in the Direction of M13. *Klaas S. de Boer and Blair D. Savage.* **265**, 210, 14-D8 (1983)
- DE GRAAUW, TH. Detection of  $\text{CH}_3\text{OH } J = 5-4$  Lines around 242 GHz from OMC-1. *W. Boland, Th. de Graauw, S. Lindholm, and T. J. Lee.* **271**, 183, 90-A4 (1983)
- DEGUCHI, S. SiO Isotopic Maser Emission from VY Canis Majoris. *S. Deguchi, J. Good, Y. Fan, X. Mao, D. Wang, and Nobuharu Ukita.* **264**, L65, 11-C8 (1983)
- Molecular Emission Which Is Probably Localized within the Central 10 Parsecs of the Galaxy. *Y. Fukui, H. Ogawa, and S. Deguchi.* **275**, L55, 148-C9 (1983)
- DE JONG, TEIJE. OH/IR Stars: Late Stages of Evolution of Intermediate-Mass Stars. *Teije de Jong.* **274**, 252, 125-E7 (1983)
- DEKEL, AVISHAI. Superclusters as Nondissipative Pancakes: Flattening. *Avishai Dekel.* **264**, 373, 6-D4 (1983)
- DE LAETER, J. R.  $r$ -Process Abundances near the Mass 130 Peak. *J. R. De Laeter and K. J. R. Rosman.* **270**, 746, 86-C1 (1983)
- DE LOORE, C. The Evolution of Massive Stars: The Numbers and Distribution of O Stars and Wolf-Rayet Stars. *Peter S. Conti, Catharine D. Garmany, C. de Loore, and D. Vanbeveren.* **274**, 302, 127-B3 (1983)
- DELSEMMÉ, A. H. Neutral Cometary Atmospheres. IV. Brightness Profiles in the Inner Coma of Comet Kahoutek 1973 XII. *A. H. Delsemmé and M. R. Combi.* **271**, 388, 92-B12 (1983)
- DE LUCIA, FRANK C. Laboratory Millimeter and Submillimeter Spectrum of  $\text{HOC}^+$ . *Geoffrey A. Blake, Paul Helminger, Eric Herbst, and Frank C. De Lucia.* **264**, L69, 11-C12 (1983)
- Laboratory Measurement of the  $J = 2 \rightarrow 3$  Rotational Transition Frequency of  $\text{HC}^{18}\text{O}^+$ . *Grant M. Plummer, Eric Herbst, and Frank C. De Lucia.* **270**, L99, 87-F7 (1983)
- DEMARQUE, PIERRE. The Ages and Compositions of Old Clusters. *Kenneth Janes and Pierre Demarque.* **264**, 206, 3-B6 (1983)
- DEMING, D. Measurements of Stratospheric Ethane in the Jovian South Polar Regions from Infrared Heterodyne Spectroscopy of the  $\nu_9$  Band near 12 Microns. *T. Kostiuik, M. J. Mumma, F. Espenak, D. Deming, D. E. Jennings, W. Maguire, and D. Zipoy.* **265**, 564, 18-B9 (1983)
- Diode Laser Heterodyne Observations of Silicon Monoxide in Sunspots: A Test of Three Sunspot Models. *D. A. Glenar, D. Deming, D. E. Jennings, T. Kostiuik, and M. J. Mumma.* **269**, 309, 68-E4 (1983)
- DENGEL, J. A Newly Discovered Nearby Planetary Nebula of Old Age. *R. Weinberger, J. Dengel, H. Hartl, and F. Sabbadin.* **265**, 249, 14-G9 (1983)
- DENNIS, B. R. Millisecond Time Variations in Hard X-Ray Solar Flares. *Alan L. Kiplinger, B. R. Dennis, A. Gordon Emslie, K. J. Frost, and L. E. Orwig.* **265**, L99, 26-E11 (1983)
- Microwave and Hard X-Ray Imaging of a Solar Flare on 1980 November 5. *P. Hoyng, K. A. Marsh, H. Zirin, and B. R. Dennis.* **268**, 865, 62-E5 (1983)
- Radio Blips and Hard X-Rays in Solar Flares. *A. O. Benz, T. E. X. Bernold, and B. R. Dennis.* **271**, 355, 91-G6 (1983)
- Recurrent Pulse Trains in the Solar Hard X-Ray Flare of 1980 June 7. *Alan L. Kiplinger, B. R. Dennis, K. J. Frost, and L. E. Orwig.* **273**, 783, 122-B6 (1983)
- DENOYER, L. K. Do the W44 and W28 Molecular Clouds Show Evidence of a Shock? *L. K. DeNoyer.* **264**, 141, 2-D9 (1983)
- DENT, W. A. *see also* LAWRENCE, A., *et al.*
- DENT, W. A. Opacity Effects at Radio Wavelengths in the Quasar 1308+326. *C. P. O'Dea, W. A. Dent, and T. J. Balonek.* **266**, L1, 32-A2 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fantì, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wiśniewski.* **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wiśniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea.* **274**, 101, 125-A9 (1983)
- DE PATER, IMKE. The Radio Structure of 3C 279. *Imke de Pater and Richard A. Perley.* **273**, 64, 112-G2 (1983)
- A Catalog of High Accuracy Circular Polarization Measurements. *Kurt W. Weiler and Imke de Pater.* **52**, 293, 13-D12 (1983) (Abstr. in **269**, 808, 75-C7)
- DERE, K. P. Chromospheric Jets: Possible Extreme-Ultraviolet Observations of Spicules. *K. P. Dere, J.-D. F. Bartoe, and G. E. Brueckner.* **267**, L65, 45-F10 (1983)
- DESAI, U. Evidence for Inhomogeneous Thermal Sources of Two Similar Solar Spike Events of 1978 May 5 and December 4. *H. J. Wiehl and U. Desai.* **270**, 256, 79-F7 (1983)
- DESAI, U. D. Observations of Two Gamma-Ray Bursts by Vela X-Ray Detectors: Erratum. *J. Terrell, E. E. Fenimore, R. W. Klebesadel, and U. D. Desai.* **269**, 806, 75-C5 (1983) (Orig. paper in **254**, 279, 29-A12)
- DESSLER, A. J. The Magnetosphere of Uranus: Plasma Sources, Convection, and Field Configuration. *G.-H. Voigt, T. W. Hill, and A. J. Dessler.* **266**, 390, 31-B8 (1983)
- DETWIELER, STEVEN L. The Quadrupole Oscillations of Neutron Stars. *Lee Lindblom and Steven L. Detweiler.* **53**, 73, 17-F7 (1983) (Abstr. in **271**, 891, 99-B13)
- DEUEL, W. The Evidence for Shell Formation in V1016 Cygni. *W. Deuel and H. Nussbaumer.* **271**, L19, 93-B4 (1983)
- DEUPREE, ROBERT G. A Survey of the Core Helium Flash with Dynamic Convection. *Robert G. Deupree and Peter W. Cole.* **269**, 676, 73-G5 (1983)
- DE VAUCOULEURS, G. Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups, Clusters, the Hercules Supercluster, and the Value of the Hubble Constant. *R. Buta and G. de Vaucouleurs.* **266**, 1, 27-A6 (1983)
- The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. I. The Basic Scale Factors of the Galaxy and Two Kinematic Tests of the Long and Short Distance Scales. *G. de Vaucouleurs.* **268**, 451, 58-A5 (1983)
- The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. II. Comparisons of Metric and Photometric Scale Lengths and Three Further Tests of the Long and Short Distance Scales. *G. de Vaucouleurs.* **268**, 468, 58-B8 (1983)
- The Magellanic Irregular Galaxy DDO 155. *G. de Vaucouleurs and C. Moss.* **271**, 123, 89-C7 (1983)
- Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups, Clusters, the Hercules Super-

- cluster, and the Value of the Hubble Constant: Erratum. *R. Buta and G. de Vaucouleurs*. **272**, 380, 105-B7 (1983) (Orig. paper in **266**, 1, 27-A6)
- Inner Ring Structures in Galaxies as Distance Indicators. III. Distances to 453 Spiral and Lenticular Galaxies. *R. Buta and G. de Vaucouleurs*. **51**, 149, 3-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- Luminosity Distribution in Galaxies. II. A Study of Accidental and Systematic Errors with Application to NGC 3379. *M. Capaccioli and G. de Vaucouleurs*. **52**, 465, 16-E10 (1983) (Abstr. in **270**, 781, 86-E8)
- Felcity Fields in Late-Type Galaxies from H $\alpha$  Fabry-Perot Interferometry. IV. Kinematics and Dynamics of the SAB(s)c Spiral NGC 5236 (M83). *G. de Vaucouleurs, W. D. Pence, and E. Davoust*. **53**, 17, 17-B6 (1983) (Abstr. in **271**, 889, 99-B11)
- DEVEAU, TERRY J. Effects of a Shock on the Molecular Composition of a Diffuse Interstellar Cloud. *George F. Mitchell and Terry J. Deveau*. **266**, 646, 35-C12 (1983)
- DEWDNEY, P. E. Discovery of a Quasar with a Wide Angle Radio Tail in a Distant Cluster of Galaxies. *D. E. Harris, P. E. Dewdney, C. H. Costain, H. Butcher, and A. G. Willis*. **270**, 39, 77-D4 (1983)
- DE ZAFRA, R. CO Emission and the Optical Disk in the Giant Sc Galaxy M101. *P. M. Solomon, J. Barrett, D. B. Sanders, and R. de Zafra*. **266**, L103, 39-C3 (1983)
- DE ZEEUW, TIM. Stellar Orbits in a Triaxial Galaxy. I. Orbits in the Plane of Rotation. *Tim de Zeeuw and David Merritt*. **267**, 571, 47-A13 (1983)
- Orbital Configurations for Gas in Elliptical Galaxies. *David Merritt and Tim de Zeeuw*. **267**, L19, 45-C9 (1983)
- DI BENEDETTO, G. P. Stellar Diameter Measurements by Two-Aperture Interferometry in the Infrared. *G. P. Di Benedetto and G. Conti*. **268**, 309, 55-C10 (1983)
- DICKEL, J. R. The Shape of Cooling Filaments in Old Supernova Remnants. *M. D. Smith and J. R. Dickel*. **265**, 272, 15-B4 (1983)
- DICKEL, JOHN R. A Multiwavelength Comparison of Cassiopeia A and Tycho's Supernova Remnant: Erratum. *John R. Dickel, Stephen S. Murray, Jeffrey Morris, and Donald C. Wells*. **264**, 746, 10-D10 (1983) (Orig. paper in **257**, 145, 62-E6)
- DICKEY, JOHN M. A New Distance to Cygnus X-3. *John M. Dickey*. **273**, L71, 123-B8 (1983)
- A Survey of H I Absorption at Low Latitudes. *John M. Dickey, Shrinivas R. Kulkarni, J. H. van Gorkom, and Carl E. Heiles*. **53**, 591, 24-G11 (1983) (Abstr. in **273**, 840, 122-F10)
- DICKINSON, DALE F. The Circumstellar Envelopes and Chromospheres of Cool Giants and Supergiants. *Wendy Hagen, Robert E. Stencel, and Dale F. Dickinson*. **274**, 286, 127-A1 (1983)
- DICKMAN, R. L. The [HCO<sup>+</sup>]/[HOC<sup>+</sup>] Abundance Ratio in Molecular Clouds. *R. C. Woods, C. S. Gudeman, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarson, L.-Å. Nyman, and H. Olofsson*. **270**, 583, 84-D14 (1983)
- A Gravitationally Stable Bok Globule. *R. L. Dickman and Dan P. Clemens*. **271**, 143, 89-E1 (1983)
- Abundances of Carbon-bearing Diatomic Molecules in Diffuse Interstellar Clouds. *R. L. Dickman, W. B. Somerville, D. C. B. Whittet, D. McNally, and J. C. Blades*. **53**, 55, 17-E2 (1983) (Abstr. in **271**, 891, 99-B13)
- DINERSTEIN, H. L. The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams*. **274**, 168, 125-F6 (1983)
- Observations of NGC 7027 from 5.2 to 7.5 Microns: The Detection of Ni II and Additional Dust Features. *J. D. Bregman, H. L. Dinerstein, J. H. Goebel, D. F. Lester, F. C. Witteborn, and D. M. Rank*. **274**, 666, 132-F7 (1983)
- DINERSTEIN, HARRIET L. The Polarization of the Infrared Cluster in Orion: The Spatial Distribution of the 3.8 Micron Polarization. *Michael W. Werner, Harriet L. Dinerstein, and R. W. Capps*. **265**, L13, 18-E10 (1983)
- A Far-Infrared Study of the N/O Abundance Ratio in Galactic H II Regions. *Daniel F. Lester, Harriet L. Dinerstein, Michael W. Werner, Dan M. Watson, and Reinhard L. Genzel*. **271**, 618, 96-C6 (1983)
- Extended Near-Infrared Emission from Visual Reflection Nebulae. *K. Sellgren, M. W. Werner, and Harriet L. Dinerstein*. **271**, L13, 93-A13 (1983)
- An Ionization Gradient across the Front of M17 SW. *Daniel F. Lester, Harriet L. Dinerstein, David M. Rank, and Diane H. Wooden*. **275**, 130, 138-D13 (1983)
- DJORGOVSKI, S. Alignment of Galaxies in the Coma Cluster. *S. Djorgovski*. **274**, L7, 129-A7 (1983)
- DOBIAŚ, JAN J. RW Tauri as a Weak V Serpente Star. *Mirek J. Plavec and Jan J. Dobias*. **272**, 206, 103-C6 (1983)
- DOBROVOLSIS, ANTHONY R. Preferred Orbit Planes in the Gravitational Field of a Tumbling Spheroidal Galaxy. *Richard H. Durisen, Joel E. Tohline, Joseph A. Burns, and Anthony R. Dobrovolskis*. **264**, 392, 6-E9 (1983)
- DOLIDZE, V. CH. Multispacecraft Hard X-Ray Observations of Fine Time Structure in Two Solar Flares. *K. Hurley, M. Niel, R. Talon, I. V. Estulin, and V. Ch. Dolidze*. **265**, 1076, 24-E1 (1983)
- DOMINY, JAMES F. Do All Barium Stars Have a White Dwarf Companion? *James F. Dominy and David L. Lambert*. **270**, 180, 78-G11 (1983)
- DOPITA, M. A. The Central X-Ray Source in RCW 103: Evidence for Blackbody Emission. *I. R. Tuohy, G. P. Garmire, R. N. Manchester, and M. A. Dopita*. **268**, 778, 61-E14 (1983)
- Supernova Remnants in the Magellanic Clouds. *D. S. Mathewson, V. L. Ford, M. A. Dopita, I. R. Tuohy, K. S. Long, and David J. Helfand*. **51**, 345, 7-F1 (1983) (Abstr. in **266**, 902, 38-B11)
- DOPITA, MICHAEL A. Ring Ejection in Type II Supernovae: IE 1012.2-7219 in the Small Magellanic Cloud. *Ian R. Tuohy and Michael A. Dopita*. **268**, L11, 57-A11 (1983)
- The Chemical Inhomogeneity of the Sculptor Dwarf Spheroidal Galaxy. *Graeme H. Smith and Michael A. Dopita*. **271**, 113, 89-B11 (1983)
- DOSCHKE, G. A. Numerical Simulations of Loops Heated to Solar Flare Temperatures. I. Gasdynamics. *Chung-Chieh Cheng, E. S. Oran, G. A. Doschek, J. P. Boris, and J. T. Mariska*. **265**, 1090, 24-F4 (1983)
- Numerical Simulations of Loops Heated to Solar Flare Temperatures. II. X-Ray and UV Spectroscopy. *G. A. Doschek, Chung-Chieh Cheng, E. S. Oran, J. P. Boris, and J. T. Mariska*. **265**, 1103, 24-G3 (1983)
- Inner-Shell Transitions in Fe XIX-XXII in the X-Ray Spectra of Solar Flares and Tokamaks. *K. J. H. Phillips, J. R. Le-men, R. D. Cowan, G. A. Doschek, and J. W. Leibacher*. **265**, 1120, 25-A10 (1983)
- Lines of Fe XII Sensitive to Coronal Electron Density. *U. Feldman, Leonard Cohen, and G. A. Doschek*. **273**, 822, 122-E4 (1983)
- Si III Line Ratios in the Sun. *P. L. Dufton, A. Hibbert, A. E. Kingston, and G. A. Doschek*. **274**, 420, 128-C9 (1983)
- DOUGLAS, J. N. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fantì, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X.*

- Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- DOWNES, RONALD A. A Second Cataclysmic Variable in a Globular Cluster. *Bruce Margon and Ronald A. Downes*. **274**, L31, 129-C6 (1983)
- DOWNES, G. S. Intensity Dependence of the Pulse Profile and Polarization of the Vela Pulsar. *S. Krishnamohan and G. S. Downes*. **265**, 372, 16-B10 (1983)
- Upper Limits on the Isotropic Gravitational Radiation Background from Pulsar Timing Analysis. *R. W. Hellings and G. S. Downes*. **265**, L39, 26-A7 (1983)
- JPL Pulsar Timing Observations. II. Geocentric Arrival Times. *G. S. Downes and P. E. Reichley*. **53**, 169, 18-F2 (1983) (Abstr. in **271**, 894, 99-C2)
- DOXSEY, R. H0323+022: A Puzzling High-Latitude X-Ray/Optical/Radio Source. *R. Doxsey, H. Bradt, J. McClintock, L. Petro, R. Remillard, G. Ricker, D. Schwartz, and K. Wood*. **264**, L43, 11-A14 (1983)
- Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. *M. Garcia, S. L. Baliunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson*. **267**, 291, 43-A13 (1983)
- DOYLE, J. G. X-Ray Line Ratios from Helium-like Ions: Updated Theory and SMM Flare Observations. *C. J. Wolfson, J. G. Doyle, J. W. Leibacher, and K. J. H. Phillips*. **269**, 319, 68-F2 (1983)
- DRAINE, B. T. Magnetohydrodynamic Shock Waves in Molecular Clouds. *B. T. Draine, W. G. Roberge, and A. Dalgarno*. **264**, 485, 7-E11 (1983)
- Magnetic Bubbles and High-Velocity Outflows in Molecular Clouds. *B. T. Draine*. **270**, 519, 82-G6 (1983)
- DRAKE, S. A. The Formation of Emission Lines in the Expanding Chromospheres of Luminous Cool Stars. I. The Importance of Atmospheric Extension and Partial Redistribution Effects. *S. A. Drake and J. L. Linsky*. **273**, 299, 115-E1 (1983)
- First Detection of Winds in Red Giants by Microwave Continuum Techniques. *S. A. Drake and J. L. Linsky*. **274**, L77, 136-C3 (1983)
- DREISER, RICHARD D. Morphology of Optical Forms of N Galaxies. *W. W. Morgan and Richard D. Dreiser*. **269**, 438, 71-C3 (1983)
- DRESSEL, L. L. NGC 315: High-Velocity H I in an Active Elliptical Galaxy? *L. L. Dressel, T. M. Bania, and M. M. Davis*. **266**, L97, 39-B12 (1983)
- DRESSLER, ALAN. Rotational Velocities and Central Velocity Dispersions for a Sample of S0 Galaxies. *Alan Dressler and Allan Sandage*. **265**, 664, 19-G6 (1983)
- Spectroscopy of Galaxies in Distant Clusters. II. The Population of the 3C 295 Cluster. *Alan Dressler and James E. Gunn*. **270**, 7, 77-A12 (1983)
- DRILLING, J. S. On the Nature of Upsilon Sagittarii. *D. Schönbauer and J. S. Drilling*. **268**, 225, 54-D6 (1983)
- The Spectra of 12 New Subluminous O Stars. *J. S. Drilling*. **270**, L13, 81-A14 (1983)
- DRYER, MURRAY. Theoretical Non-Maxwellian Particle Velocity Distribution Functions for Spherically Symmetric Solar Wind-like Plasma Systems and Consequences. *Sami Cuperman, Itzhak Weiss, and Murray Dryer*. **273**, 363, 116-B14 (1983)
- DUF0UR, REGINALD J. The Probable Association of SN 1957d in NGC 5236 (M83) with an Unresolved Radio Source. *Robert L. Pennington and Reginald J. Dufour*. **270**, L7, 81-A8 (1983)
- Digital Analysis of Narrow-Band Imagery of the Cygnus Loop. *J. Jeff Hester, Robert A. R. Parker, and Reginald J. Dufour*. **273**, 219, 114-E10 (1983)
- DUFTON, P. L. Si III Line Ratios in the Sun. *P. L. Dufton, A. Hibbert, A. E. Kingston, and G. A. Doschek*. **274**, 420, 128-C9 (1983)
- DULDIG, M. *see* LAWRENCE, A., *et al.*
- DULK, GEORGE A. Radio Emission from AM Herculis: The Quiescent Component and an Outburst. *George A. Dulk, Timothy S. Bastien, and G. Channugan*. **273**, 249, 115-A7 (1983)
- DUNCAN, COMER. Large-Amplitude Spherically Symmetric Perturbations in the Early Universe. I. The Initial Data. *Comer Duncan*. **275**, 35, 137-C13 (1983)
- DUNCAN, DOUGLAS K. Lithium Abundance and Age Spread in the Pleiades. *Douglas K. Duncan and Burton F. Jones*. **271**, 663, 96-F9 (1983)
- DUNCAN, MARTIN J. Hierarchical Merging and the Structure of Elliptical Galaxies. *Rida T. Farouki, Stuart L. Shapiro, and Martin J. Duncan*. **265**, 597, 19-B5 (1983)
- Monte Carlo Simulations of the Evolution of Galactic Nuclei Containing Massive, Central Black Holes. *Martin J. Duncan and Stuart L. Shapiro*. **268**, 565, 59-C1 (1983)
- Simulations of Galaxy Mergers: Cannibalism and Dynamical Friction. *Martin J. Duncan, Rida T. Farouki, and Stuart L. Shapiro*. **271**, 22, 88-B13 (1983)
- DUNCAN, ROBERT C. Equilibrium Composition and Neutrino Emissivity of Interacting Quark Matter in Neutron Stars. *Robert C. Duncan, Stuart L. Shapiro, and Ira Wasserman*. **267**, 358, 43-F12 (1983)
- DUPREE, A. K. Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. *Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers*. **268**, 205, 54-B14 (1983)
- Chromospheric and Coronal Emissions from the Giants in the Hyades. *S. L. Baliunas, L. Hartmann, and A. K. Dupree*. **271**, 672, 96-G4 (1983)
- White Dwarfs and the Interstellar Medium. *A. K. Dupree and J. C. Raymond*. **275**, L71, 148-D10 (1983)
- DURIC, NEBOJSA. VLA Radio Continuum Observations of the Edge-on Spiral Galaxy NGC 3079. *Nebojsa Duric, E. R. Seaquist, Patrick C. Crane, R. C. Bignell, and L. E. Davis*. **273**, L11, 117-B12 (1983)
- DURISEN, RICHARD H. Preferred Orbit Planes in the Gravitational Field of a Tumbling Spheroidal Galaxy. *Richard H. Durisen, Joel E. Tohline, Joseph A. Burns, and Anthony R. Dobrovolskis*. **264**, 392, 6-E9 (1983)
- X-Ray Spectra and Light Curves of Accreting Magnetic Degenerate Dwarfs. *James N. Imamura and Richard H. Durisen*. **268**, 291, 55-B4 (1983)
- DURNEY, B. R. Preliminary Observations of Velocity Fields at the Solar Poles. *L. E. Cram, B. R. Durney, and D. B. Guenther*. **267**, 442, 44-E13 (1983)
- On the First-Order Smoothing Expression for the  $\alpha$ -Effect in Dynamo Theory. *B. R. Durney*. **267**, 822, 49-F11 (1983)
- On the Large-Scale Dynamics of Rapidly Rotating Convection Zones. *B. R. Durney*. **269**, 671, 73-F14 (1983)
- DUROUCHOUX, PH. Hard X-Ray Observations of the Crab Nebula and A0535+26 with a High Energy Resolution Spectrometer. *J. M. Hameury, D. Boclet, Ph. Durouchoux, T. L. Cline, W. S. Paciesas, B. J. Teegarden, J. Tueller, and R. C. Haymes*. **270**, 144, 78-D14 (1983)
- DURRANCE, S. T. Temporal Variations of the Jovian H I Lyman-Alpha Emission (1979-1982). *T. E. Skinner, S. T. Durrance, P. D. Feldman, and H. W. Moos*. **265**, L23, 18-F6 (1983)
- Rocket Detection of Ultraviolet Emission from Neutral Oxygen and Sulfur in the Io Torus. *S. T. Durrance, P. D. Feldman, and H. A. Weaver*. **267**, L125, 51-D14 (1983)
- IUE Spectrum of the Io Torus: Identification of the  $^3S_2 \rightarrow ^3P_{2,1}$  Transitions of S III. *H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou*. **275**, L19, 141-G4 (1983)
- DWEK, E. The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown,*

- R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams. **274**, 168, 125-F6 (1983)
- DWEK, ELIAHU. The Infrared Echo of a Type II Supernova with a Circumstellar Dust Shell: Applications to SN 1979c and SN 1980k. *Eliahu Dwek*. **274**, 175, 125-F13 (1983)
- DYCK, H. M. Speckle Interferometry of IRC + 10216 in the Fundamental Vibration-Rotation Lines of CO. *H. M. Dyck, S. Beckwith, and B. Zuckerman*. **271**, L79, 100-C7 (1983)
- EASTMAN, RONALD G. High-Velocity Absorbing Cloudlets as Potential Contributors to Observed Quasar Continua. *Ronald G. Eastman, Gordon M. MacAlpine, and Douglas O. Richstone*. **275**, 53, 137-E3 (1983)
- EATON, JOEL A. Chromospheric Emission of W Ursae Majoris-Type Stars and Its Relation to the Structure of Their Common Envelopes. *Joel A. Eaton*. **268**, 800, 61-G8 (1983)
- EBBETS, DENNIS C. The Nature of R136a, the Superluminous Central Object of the 30 Doradus Nebula. *Blair D. Savage, Edward L. Fitzpatrick, Joseph P. Cassinelli, and Dennis C. Ebbets*. **273**, 597, 120-B1 (1983)
- EDDY, JOHN A. Sunspot Areas and Solar Irradiance Variations during 1980. *Douglas V. Hoyt, John A. Eddy, and Hugh S. Hudson*. **275**, 878, 147-B7 (1983)
- EDGAR, RICHARD J. Another Self-similar Blast Wave: Early Time Asymptote with Shock-heated Electrons and High Thermal Conductivity. *Donald P. Cox and Richard J. Edgar*. **265**, 443, 16-G11 (1983)
- EDWARDS, SUZAN. A Survey of High-Velocity Molecular Gas in the Vicinity of Herbig-Haro Objects. I. *Suzan Edwards and Ronald L. Snell*. **270**, 605, 84-F8 (1983)
- EFSTATHIOU, G. The Clustering of Galaxies in a Complete Redshift Survey. *T. Shanks, A. J. Bean, G. Efsthathiou, R. S. Ellis, R. Fong, and B. A. Peterson*. **274**, 529, 130-G8 (1983)
- EFSTATHIOU, GEORGE. The Kinematic Properties of Faint Elliptical Galaxies. *Roger L. Davies, George Efsthathiou, S. Michael Fall, Garth Illingworth, and Paul L. Schechter*. **266**, 41, 27-D4 (1983)
- EGGEN, OLIN J. Luminosity and Motion of Large Proper Motion Stars. II. Stars with Annual Proper Motion Larger than 0.7 Arc Seconds. *Olin J. Eggen*. **51**, 183, 4-A2 (1983) (Abstr. in **264**, 747, 10-D11)
- EGGLETON, PETER P. Approximations to the Radii of Roche Lobes. *Peter P. Eggleton*. **268**, 368, 55-G13 (1983)
- Lambda Tauri: A Probe of Angular Momentum Loss in Algol Binaries. *Charles D. Bailyn and Peter P. Eggleton*. **274**, 763, 133-F6 (1983)
- EICHLER, DAVID. Focusing of High-Mach Number Jets by an Ambient Medium. *David Eichler*. **272**, 48, 101-E7 (1983)
- EILEK, JEAN A. The High-Energy Spectrum of Hot Accretion Disks. *Jean A. Eilek and Minas Kafatos*. **271**, 804, 98-C5 (1983)
- EKBERG, JAN OLOF. Upper Limits to O III  $\lambda 5592$  and [Ni IX]  $\lambda 594$  in Seyfert Galaxies. *Donald E. Osterbrock, Oved Dahari, and Jan Olof Ekberg*. **273**, L31, 117-D3 (1983)
- EKERS, R. D. Radio Structure and Optical Kinematics of the cD Galaxy Hydra A (3C 218). *R. D. Ekers and S. M. Simkin*. **265**, 85, 13-A5 (1983)
- H I Observations of the High-Velocity System in NGC 1275. *J. H. van Gorkom and R. D. Ekers*. **267**, 528, 46-E12 (1983)
- Einstein Observations of NGC 4438: Dynamical Ablation of Gas in the Virgo Cluster. *C. Kotanyi, J. H. van Gorkom, and R. D. Ekers*. **273**, L7, 117-B7 (1983)
- ELIAS, J. H. Infrared Light Curves of Type I Supernovae. II. Late Stages. *J. H. Elias and Jay A. Frogel*. **268**, 718, 61-A9 (1983)
- Herbig-Haro Objects in the Dust Globule ESO 210-6A. *J. A. Graham and J. H. Elias*. **272**, 615, 108-E2 (1983)
- ELITZUR, M. A Multilevel Model for Astronomical SiO Masers. *M. Elitzur, W. D. Watson, and L. R. Western*. **274**, 210, 126-B6 (1983)
- ELITZUR, MOSHE. On Vibrational Excitations of Interstellar Molecules. *Moshe Elitzur*. **266**, 609, 35-A1 (1983)
- Shock Formation of HCO<sup>+</sup>. *Moshe Elitzur*. **267**, 174, 41-G4 (1983)
- Stimulated Emission and the Flat Balmer Decrements of Cataclysmic Variable Stars. *Moshe Elitzur, G. J. Ferland, W. G. Mathews, and G. A. Shields*. **272**, L55, 111-B3 (1983)
- ELLIS, R. S. The Clustering of Galaxies in a Complete Redshift Survey. *T. Shanks, A. J. Bean, G. Efsthathiou, R. S. Ellis, R. Fong, and B. A. Peterson*. **274**, 529, 130-G8 (1983)
- ELMEGREEN, BRUCE G. Flocculent and Grand Design Spiral Galaxies in Groups: Time Scales for the Persistence of Grand Design Spiral Structures. *Bruce G. Elmegreen and Debra Meloy Elmegreen*. **267**, 31, 40-C8 (1983)
- ELMEGREEN, DEBRA MELOY. Flocculent and Grand Design Spiral Galaxies in Groups: Time Scales for the Persistence of Grand Design Spiral Structures. *Bruce G. Elmegreen and Debra Meloy Elmegreen*. **267**, 31, 40-C8 (1983)
- ELSNER, R. F. On Searches for Pulsed Emission with Application to Four Globular Cluster X-Ray Sources: NGC 1851, 6441, 6624, and 6712. *D. A. Leahy, W. Darbro, R. F. Elsner, M. C. Weisskopf, P. G. Sutherland, S. Kahn, and J. E. Grindlay*. **266**, 160, 28-F9 (1983)
- X-Ray Observations of 4U 1626-67 by the Monitor Counter on the Einstein (HEAO 2) Observatory. *R. F. Elsner, W. Darbro, D. Leahy, M. C. Weisskopf, P. G. Sutherland, S. M. Kahn, and J. E. Grindlay*. **266**, 769, 36-F6 (1983)
- The Period History of the X-Ray Pulsar in MSH 15-52. *M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Narayan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward*. **267**, 711, 48-E5 (1983)
- On Searches for Periodic Pulsed Emission: The Rayleigh Test Compared to Epoch Folding. *D. A. Leahy, R. F. Elsner, and M. C. Weisskopf*. **272**, 256, 103-F14 (1983)
- X-Ray Observations of LMC X-3 with the Monitor Proportional Counter aboard the HEAO 2 Einstein Observatory: A Comparison with Cygnus X-1. *M. C. Weisskopf, S. M. Kahn, W. D. Darbro, R. F. Elsner, J. E. Grindlay, S. Narayan, P. G. Sutherland, and A. C. Williams*. **274**, L65, 136-B7 (1983)
- ELVIS, M. Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. *M. Garcia, S. L. Balunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson*. **267**, 291, 43-A13 (1983)
- ELVIS, MARTIN. Extended Soft X-Ray Emission from NGC 4151. *Martin Elvis, Ulrich G. Briel, and J. Patrick Henry*. **268**, 105, 53-A13 (1983)
- EMERY, R. J. IR Maps of M17 in the [O III] 88 Micron and 52 Micron Lines and [N III] 57 Micron Line Measurements. *R. J. Emery, D. A. Naylor, B. Fitton, I. Furniss, R. E. Jennings, and K. J. King*. **268**, 721, 61-A12 (1983)
- EMSLIE, A. GORDON. Millisecond Time Variations in Hard X-Ray Solar Flares. *Alan L. Kiplinger, B. R. Dennis, A. Gordon Emslie, K. J. Frost, and L. E. Orwig*. **265**, L99, 26-E11 (1983)
- Thick-Target Bremsstrahlung Interpretation of Short Time-Scale Solar Hard X-Ray Features. *A. Gordon Emslie*. **271**, 367, 92-A4 (1983)
- ENGELKE, C. Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. *A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsumoto, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs*. **271**, 793, 98-B8 (1983)
- ENGVOLD, ODDBJORN. Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and*



- Oddbjorn Engvold. **274**, 801, 134-B5 (1983)
- ENOME, S. Acceleration and Confinement of Energetic Particles in the 1980 June 7 Solar Flare. S. R. Kane, K. Kai, T. Kosugi, S. Enome, P. B. Landecker, and D. L. McKenzie. **271**, 376, 92-A14 (1983)
- EPSTEIN, E. E. Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek. **268**, 68, 52-F3 (1983)
- EPSTEIN, R. I. Structure of Neutron Star Envelopes. E. H. Gudmundsson, C. J. Pethick, and R. I. Epstein. **272**, 286, 104-B2 (1983)
- ERICKSON, EDWIN F. Modeling of G333.6-0.2 as a Spherical H II Region. Robert H. Rubin, David J. Hollenbach, and Edwin F. Erickson. **265**, 239, 14-F13 (1983)
- ERICKSON, W. C. What Is 4C 21.53? W. C. Erickson. **264**, L13, 5-A13 (1983)
- ERIKSSON, KJELL. The Narrow Ultraviolet Emission Lines of the Red Dwarf AU Microscopii (dM1.6e). Thomas R. Ayres, Kjell Eriksson, Jeffrey L. Linsky, and R. E. Stencel. **270**, L17, 80-B4 (1983)
- Outer Atmospheres of Cool Stars. XIV. A Model for the Chromosphere and Transition Region of Beta Ceti (G9.5 III). Kjell Eriksson, Jeffrey L. Linsky, and Theodore Simon. **272**, 665, 109-A13 (1983)
- ERSHKOVICH, A. I. On the Penetration of the Solar Wind into the Cometary Ionosphere. A. I. Ershkovich and D. A. Mendis. **269**, 743, 74-E12 (1983)
- ERSHKOVICH, ALEXANDER I. The Effect of MHD Instabilities on the Flaring of Cometary Plasma Tails. Malcolm B. Niedner, Jr., Alexander I. Ershkovich, and John C. Brandt. **272**, 362, 105-A3 (1983)
- ESPENAK, F. Measurements of Stratospheric Ethane in the Jovian South Polar Regions from Infrared Heterodyne Spectroscopy of the  $\nu_9$  Band near 12 Microns. T. Kostiuik, M. J. Mumma, F. Espenak, D. Deming, D. E. Jennings, W. Maguire, and D. Zipoy. **265**, 564, 18-B9 (1983)
- ESTULIN, I. V. Multispacecraft Hard X-Ray Observations of Fine Time Structure in Two Solar Flares. K. Hurley, M. Niel, R. Talon, I. V. Estulin, and V. Ch. Dolidze. **265**, 1076, 24-E1 (1983)
- EVANS, NANCY REMAGE. A Search for Light-Time Effects in Binary Cepheids: AW Persei. Nancy Remage Evans. **272**, 214, 103-C14 (1983)
- EVANS, NEAL J., II. Observations of the Extinction and Excitation of the Molecular Hydrogen Emission in Orion. S. Beckwith, Neal J. Evans II, I. Gatley, G. Gull, and R. W. Russell. **264**, 152, 2-E6 (1983)
- EVENSON, K. M. Laboratory Measurement of the  $4_{u-3_{l1}}$  70 GHz Transition of Ground-State Methylene ( $\text{CH}_2$ ). F. J. Lovas, R. D. Suenram, and K. M. Evenson. **267**, L131, 51-E5 (1983)
- The Microwave and Far-Infrared Spectra of the CH Radical. J. M. Brown and K. M. Evenson. **268**, L51, 57-D13 (1983)
- EVENSON, P. A Quantitative Test of Solar Modulation Theory: The Proton, Helium, and Electron Spectra from 1965 through 1979. P. Evenson, M. Garcia-Munoz, P. Meyer, K. R. Pyle, and J. A. Simpson. **275**, L15, 141-F14 (1983)
- EVENSON, PAUL. Protons from the Decay of Solar Flare Neutrons. Paul Evenson, Peter Meyer, and K. Roger Pyle. **274**, 875, 135-A1 (1983)
- EVERSON, B. L. Pulsations and Viscosity. J. P. Cox and B. L. Everson. **52**, 451, 16-D11 (1983) (Abstr. in **270**, 780, 86-E7)
- EVJATAR, A. Coulomb Thermal Properties and Stability of the Io Plasma Torus. D. D. Barbosa, F. V. Coroniti, and A. Evjatar. **274**, 429, 128-D4 (1983)
- EWING, M. S. Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney. **265**, 107, 13-C2 (1983)
- FABBIANO, G. X-Ray and Ultraviolet Observations of Extragalactic H II Regions. G. Fabbiano and N. Panagia. **266**, 568, 34-D12 (1983)
- X-Ray Observations of the Antennae (NGC 4038/39). G. Fabbiano and G. Trinchieri. **266**, L5, 32-A5 (1983)
- Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704 + 241. M. Garcia, S. L. Baliunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson. **267**, 291, 43-A13 (1983)
- FABBIANO, GIUSEPPINA. Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson. **274**, 125, 125-C5 (1983)
- FABER, S. M. Is There Nonluminous Matter in Dwarf Spheroidal Galaxies? S. M. Faber and D. N. C. Lin. **266**, L17, 32-B3 (1983)
- Some Implications of Nonluminous Matter in Dwarf Spheroidal Galaxies. D. N. C. Lin and S. M. Faber. **266**, L21, 32-B7 (1983)
- FABIAN, A. C. Why Are Broad Emission Lines Seen in Seyfert Galaxies and Not in BL Lacertae Objects? P. W. Guilbert, A. C. Fabian, and Richard McCray. **266**, 466, 33-D6 (1983)
- FABIAN, ANDREW C. Radiative Accretion of Intracluster Gas onto Dominant Galaxies in Poor Clusters. Claude R. Canizares, Gordon C. Stewart, and Andrew C. Fabian. **272**, 449, 106-F6 (1983)
- FABRICANT, D. Further Evidence for M87's Massive, Dark Halo. D. Fabricant and P. Gorenstein. **267**, 535, 46-F5 (1983)
- FALGARONE, EDITH. Einstein Observations of the Rho Ophiuchi Dark Cloud: An X-Ray Christmas Tree. Thierry Montmerle, Lydie Koch-Miramond, Edith Falgarone, and Jonathan E. Grindlay. **269**, 182, 67-A11 (1983)
- FALL, S. MICHAEL. The Kinematic Properties of Faint Elliptical Galaxies. Roger L. Davies, George Efsthathiou, S. Michael Fall, Garth Illingworth, and Paul L. Schechter. **266**, 41, 27-D4 (1983)
- FAN, Y. SiO Isotopic Maser Emission from VY Canis Majoris. S. Deguchi, J. Good, Y. Fan, X. Mao, D. Wang, and Nobuharu Ukita. **264**, L65, 11-C8 (1983)
- FANTI, C. The QSO 1156 + 295: A Multifrequency Study of Recent Activity. Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- FAROUKI, R. T. The Collapse and Violent Relaxation of N-Body Systems: Mass Segregation and the Secondary Maximum. R. T. Farouki, G. L. Hoffman, and E. E. Salpeter. **271**, 11, 88-B2 (1983)
- FAROUKI, RIDA T. Hierarchical Merging and the Structure of Elliptical Galaxies. Rida T. Farouki, Stuart L. Shapiro, and Martin J. Duncan. **265**, 597, 19-B5 (1983)
- Simulations of Galaxy Mergers: Cannibalism and Dynamical Friction. Martin J. Duncan, Rida T. Farouki, and Stuart L. Shapiro. **271**, 22, 88-B13 (1983)
- FEDERMAN, S. R. Electron and Local Gas Densities in Diffuse Interstellar Clouds from Measurements of Ca I Absorption. S. R. Federman and L. M. Hobbs. **265**, 813, 21-E13 (1983)
- The 'D'-P Transition in Atomic Oxygen Induced by Collisions with Atomic Hydrogen. S. R. Federman and E. J. Shipsey. **269**, 791, 75-B4 (1983)
- FEIBELMAN, WALTER A. The Planetary Nebula IC 3568: A Model Based on IUE Observations. J. Patrick Harrington and Wal-



- ter A. Feibelman. **265**, 258, 15-A4 (1983)
- The Binary Central Star of the Planetary Nebula LT-5. Walter A. Feibelman and James B. Kaler. **269**, 592, 72-G11 (1983)
- IUE Observations of the Perplexing Bipolar Planetary Nebula NGC 2346. Walter A. Feibelman and Lawrence H. Aller. **270**, 150, 78-E6 (1983)
- Ultraviolet Observations of M1-2 (= VV 8). Walter A. Feibelman. **275**, 628, 144-D9 (1983)
- Spectrophotometric Observations of Symbiotic Stars and Related Objects. William P. Blair, Robert E. Stencel, Walter A. Feibelman, and Andrew G. Michalitsianos. **53**, 573, 24-F7 (1983) (Abstr. in **273**, 839, 122-F9)
- FEIGELSON, E. D. VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. Isabella M. Gioia, E. D. Feigelson, T. Maccacaro, R. Schild, and G. Zamorani. **271**, 524, 95-C1 (1983)
- FEIGELSON, ERIC D. Observations of Suspected Low-Mass Post-T Tauri Stars and Their Evolutionary Status. Reinhard Mundt, Frederick M. Walter, Eric D. Feigelson, Ulrich Finkenzeller, George H. Herbig, and Andrew P. Odell. **269**, 229, 67-F3 (1983)
- X-Ray Observations of 20 3CR Radio Galaxies and Their Environs. Eric D. Feigelson and Christophe J. Berg. **269**, 400, 70-G7 (1983)
- The Inner Radio Structure of Centaurus A: Clues to the Origin of the Jet X-Ray Emission. Jack O. Burns, Eric D. Feigelson, and Ethan J. Schreier. **273**, 128, 113-E6 (1983)
- FEIX, M. R. QUIPS: Time-dependent Properties of Quasi-invariant Self-gravitating Polytropes. A. Munier and M. R. Feix. **267**, 344, 43-E12 (1983)
- FEKEL, FRANCIS C. Speckle Interferometric Measurements of Binary Stars. VIII. Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, Belva G. Campbell, and Francis C. Fekel. **51**, 309, 6-F1 (1983) (Abstr. in **265**, 1135, 25-B11)
- FEKEL, FRANCIS C., JR. HR 7578: A K Dwarf Double-lined Spectroscopic Binary with Peculiar Abundances. Francis C. Fekel, Jr. and W. I. Beavers. **267**, 682, 48-C2 (1983)
- Spectroscopy of V711 Tauri (= HR 1099): Fundamental Properties and Evidence for Starspots. Francis C. Fekel, Jr. **268**, 274, 55-A1 (1983)
- FELDMAN, P. A. The Detection of Butadiynyl (C<sub>4</sub>H) in Absorption against Cassiopeia A. M. B. Bell, P. A. Feldman, and H. E. Matthews. **273**, L35, 117-D7 (1983)
- FELDMAN, P. D. Temporal Variations of the Jovian H I Lyman-Alpha Emission (1979-1982). T. E. Skinner, S. T. Durrance, P. D. Feldman, and H. W. Moos. **265**, L23, 18-F6 (1983)
- Rocket Detection of Ultraviolet Emission from Neutral Oxygen and Sulfur in the Io Torus. S. T. Durrance, P. D. Feldman, and H. A. Weaver. **267**, L125, 51-D14 (1983)
- IUE Spectrum of the Io Torus: Identification of the  $^3S_2 \rightarrow ^3P_{2,1}$  Transitions of S III. H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou. **275**, L19, 141-G4 (1983)
- FELDMAN, PAUL D. The Discovery of S<sub>2</sub> in Comet Iras-Araki-Alcock 1983d. Michael F. A'Hearn, Paul D. Feldman, and David G. Schleicher. **274**, L99, 136-E2 (1983)
- FELDMAN, U. Lines of Fe XII Sensitive to Coronal Electron Density. U. Feldman, Leonard Cohen, and G. A. Doschek. **273**, 822, 122-E4 (1983)
- On the Unresolved Fine Structures of the Solar Atmosphere in the  $3 \times 10^{-2} \times 10^5$  K Temperature Region. U. Feldman. **275**, 367, 141-A5 (1983)
- FELDMAN, URI. He D<sub>3</sub> as a Diagnostic for the Hard and Soft X-Rays from Solar Flares. Uri Feldman, Margaret Liggett, and Harold Zirin. **271**, 832, 98-E5 (1983)
- FELLI, M. Infrared Line and Radio Continuum Emission of Circumstellar Ionized Regions. M. Simon, M. Felli, L. Cassar, J. Fischer, and M. Massi. **266**, 623, 35-B1 (1983)
- FENIMORE, E. E. Time-resolved Ultraviolet and Optical Spectroscopy of the Pulsating X-Ray Source H2252-035. France A. Córdova, E. E. Fenimore, John Middleditch, and Keith O. Mason. **265**, 363, 16-B1 (1983)
- Observations of Two Gamma-Ray Bursts by Vela X-Ray Detectors: Erratum. J. Terrell, E. E. Fenimore, R. W. Klebesadel, and U. D. Desai. **269**, 806, 75-C5 (1983) (Orig. paper in **254**, 279, 29-A12)
- FERLAND, G. J. Stimulated Emission and the Flat Balmer Decereements of Cataclysmic Variable Stars. Moshe Elitzur, G. J. Ferland, W. G. Mathews, and G. A. Shields. **272**, L55, 111-B3 (1983)
- FERLAND, GARY J. Are There Any Shock-heated Galaxies? Gary J. Ferland and Hagai Netzer. **264**, 105, 2-B1 (1983)
- FERNIE, J. D. Pulsion Mode Switching in HD 161796. J. D. Fernie. **265**, 999, 23-F5 (1983)
- Cepheids in Open Clusters and Associations. J. D. Fernie and R. McGonegal. **275**, 732, 145-E1 (1983)
- New UBVR Photometry for 900 Supergiants. J. D. Fernie. **52**, 7, 9-A8 (1983) (Abstr. in **267**, 893, 50-E1)
- FERRARI-TONIOLO, MARCO. Infrared Photometry and Mass Loss Rates for Of-Type Stars. Paolo Persi, Marco Ferrari-Toniolo, and Gary L. Grasdale. **269**, 625, 73-C5 (1983)
- FESEN, R. A. The Structure and Emission Spectrum of a Non-radiative Shock Wave in the Cygnus Loop. J. C. Raymond, W. P. Blair, R. A. Fesen, and T. R. Gull. **275**, 636, 144-E3 (1983)
- FESEN, ROBERT A. Discovery of Large Radial Velocities in the Supernova Remnant 3C 58. Robert A. Fesen. **270**, L53, 87-B13 (1983)
- Deep [O III] Interference Filter Imagery of the Supernova Remnants G65.3+5.7, G126.2+1.2, CTA 1, and VRO 42.05.01. Robert A. Fesen and Theodore R. Gull. **51**, 337, 7-D1 (1983) (Abstr. in **266**, 902, 38-B11)
- FESTOU, M. C. Lyman-Alpha Observations of Comets West 1976 VI and P/D'Arrest 1976 XI with Copernicus. M. C. Festou, H. U. Keller, J.-L. Bertaux, and E. S. Barker. **265**, 925, 23-A1 (1983)
- IUE Spectrum of the Io Torus: Identification of the  $^3S_2 \rightarrow ^3P_{2,1}$  Transitions of S III. H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou. **275**, L19, 141-G4 (1983)
- FICKLE, R. K. Cosmic-Ray Abundances of Sn, Te, Xe, and Ba Nuclei Measured on HEAO 3. W. R. Binns, R. K. Fickle, T. L. Garrard, M. H. Israel, J. Klarmann, K. E. Krombel, E. C. Stone, and C. J. Waddington. **267**, L93, 51-B12 (1983)
- FILIPPENKO, ALEXEI V. The Stellar and Nonstellar Continua of Seyfert Galaxies: Nonthermal Emission in the Near-Infrared. Matthew A. Malkan and Alexei V. Filippenko. **275**, 477, 142-F8 (1983)
- FINK, UWE. The NH<sub>3</sub> Spectrum in Saturn's 5 Micron Window. Uwe Fink, Harold P. Larson, Gordon L. Bjoraker, and James R. Johnson. **268**, 880, 62-F5 (1983)
- The 0.9-2.5 Micron Spectrum of Comet West 1976 VI. James R. Johnson, Uwe Fink, and Harold P. Larson. **270**, 769, 86-D10 (1983)
- FINKENZELLER, ULRICH. Observations of Suspected Low-Mass Post-T Tauri Stars and Their Evolutionary Status. Reinhard Mundt, Frederick M. Walter, Eric D. Feigelson, Ulrich Finkenzeller, George H. Herbig, and Andrew P. Odell. **269**, 229, 67-F3 (1983)
- FISCHER, J. Infrared Line and Radio Continuum Emission of Circumstellar Ionized Regions. M. Simon, M. Felli, L. Cassar, J. Fischer, and M. Massi. **266**, 623, 35-B1 (1983)
- Luminous Molecular Hydrogen Emission in the Galaxy System NGC 3690-IC 694. J. Fischer, M. Simon, J. Benson, and P. M. Solomon. **273**, L27, 117-C13 (1983)
- FISHER, GEORGE H. Flare Loop Radiative Hydrodynamics. III. Nonlocal Radiative Transfer Effects. Richard C. Canfield, George H. Fisher, and A. N. McClymont. **265**, 507, 17-E5 (1983)
- Flare Loop Radiative Hydrodynamics. IV. Dynamic Evolution

- of Unstable Semiempirical Loop Models. *Chang-Hyuk An, Richard C. Canfield, George H. Fisher, and A. N. McClymont*. **267**, 421, 44-D5 (1983)
- FISHMAN, G. J. The Pulse Profile of the Crab Pulsar in the Energy Range 45 keV–1.2 MeV. *R. B. Wilson and G. J. Fishman*. **269**, 273, 68-B8 (1983)
- FITTON, B. IR Maps of M17 in the [O III] 88 Micron and 52 Micron Lines and [N III] 57 Micron Line Measurements. *R. J. Emery, D. A. Naylor, B. Fitton, I. Furniss, R. E. Jennings, and K. J. King*. **268**, 721, 61-A12 (1983)
- FITZPATRICK, EDWARD L. Peculiar Ultraviolet Interstellar Extinction. *Derck Massa, Blair D. Savage, and Edward L. Fitzpatrick*. **266**, 662, 35-D14 (1983)
- Ultraviolet Interstellar Absorption toward HD 5980 in the Small Magellanic Cloud. *Edward L. Fitzpatrick and Blair D. Savage*. **267**, 93, 41-A6 (1983)
- The Nature of R136a, the Superluminous Central Object of the 30 Doradus Nebula. *Blair D. Savage, Edward L. Fitzpatrick, Joseph P. Cassinelli, and Dennis C. Ebbets*. **273**, 597, 120-B1 (1983)
- FLÅ, T. Magnetohydrostatic Model of Solar Faculae. *Vladimir A. Osherovich, T. Flå, and G. A. Chapman*. **268**, 412, 56-D3 (1983)
- FLÅ, TOR. Alfvén Waves in Stellar Winds. *Thomas E. Holzer, Tor Flå, and Egil Leer*. **275**, 808, 146-D3 (1983)
- FLECK, ROBERT C., JR. On Scaling the Magnetic Field Strength in Interstellar Clouds: Resolution of the "B versus n Dilemma". *Robert C. Fleck, Jr.* **264**, 139, 2-D7 (1983)
- Cosmic Turbulence and the Angular Momenta of Astronomical Systems: Erratum. *Robert C. Fleck, Jr.* **267**, 891, 50-D13 (1983) (Orig. paper in **261**, 631, 118-E11)
- Scalloped Disk Galaxies: A Kelvin-Helmholtz Instability? *Robert C. Fleck, Jr.* **270**, 507, 83-F8 (1983)
- A Note on Compressibility and Energy Cascade in Turbulent Molecular Clouds. *Robert C. Fleck, Jr.* **272**, L45, 111-A8 (1983)
- FLORKOWSKI, D. R. The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35$  c. *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming*. **273**, L65, 123-B3 (1983)
- FLOWER, PHILLIP. The Age and Composition of the LMC Red Globular Cluster NGC 2121. *Phillip Flower, Douglas Geisler, Paul Hodge, Edward Olszewski, and Robert Schommer*. **275**, 15, 137-B7 (1983)
- FOLTZ, C. B. Identification of CW 1103 + 254 as a New Magnetic Variable. *H. S. Stockman, C. B. Foltz, G. D. Schmidt, and S. Tapia*. **271**, 725, 97-D5 (1983)
- FOLTZ, CRAIG B. Common Lyman-Alpha Absorption Lines in the Triple QSO PG 1115 + 08. *Ray J. Weymann and Craig B. Foltz*. **272**, L1, 105-D2 (1983)
- FOMALONT, E. B. 3C 395—A Quasar with Asymmetrical Radio Structure. *K. J. Johnston, J. H. Spencer, A. Witzel, and E. B. Fomalont*. **265**, L43, 26-A11 (1983)
- Limits to the Rate of Component Separation in Scorpius X-1. *E. B. Fomalont, B. J. Geldzahler, R. M. Hjellming, and C. M. Wade*. **275**, 802, 146-C11 (1983)
- FONG, R. The Clustering of Galaxies in a Complete Redshift Survey. *T. Shanks, A. J. Bean, G. Efsthionou, R. S. Ellis, R. Fong, and B. A. Peterson*. **274**, 529, 130-G8 (1983)
- FONTAINE, G. The Pulsation Properties of DB White Dwarfs: A Preliminary Analysis. *D. E. Winget, H. M. Van Horn, M. Tassoul, C. J. Hansen, and G. Fontaine*. **268**, L33, 57-C10 (1983)
- G74-7: A True DA,F (DAZ) White Dwarf. *P. Lacombe, James Liebert, F. Wesemael, and G. Fontaine*. **272**, 660, 109-A8 (1983)
- FONTANELLI, P. Neutral Hydrogen in X-Ray Cluster Galaxies: A1367. *Guido L. Chincarini, R. Giovanelli, M. Haynes, and P. Fontanelli*. **267**, 511, 46-D9 (1983)
- FORD, G. W. Absorption of Radiation Propagating Obliquely in a Magnetoplasma. *A. Khandker, R. F. O'Connell, and G. W. Ford*. **269**, 668, 73-F11 (1983)
- FORD, HOLLAND. Paired Quasars near NGC 2639: Evidence for Quasars in Superclusters? *Holland Ford, Robin Ciardullo, and Richard Harms*. **266**, 451, 33-C4 (1983)
- H $\alpha$  Observations of Four Novae in M31. *Robin Ciardullo, Holland Ford, and George Jacoby*. **272**, 92, 102-A11 (1983)
- Redshifts of Groups and Clusters in the Rich Superclusters 1451 + 22 and 1615 + 43. *Robin Ciardullo, Holland Ford, Frank Bariko, and Richard Harms*. **273**, 24, 112-C10 (1983)
- FORD, HOLLAND C. The Hydrogen-depleted Planetary Nebulae Abell 30 and Abell 78. *George H. Jacoby and Holland C. Ford*. **266**, 298, 30-B13 (1983)
- FORD, V. L. Supernova Remnants in the Magellanic Clouds. *D. S. Mathewson, V. L. Ford, M. A. Dopita, I. R. Tuohy, K. S. Long, and David J. Helfand*. **51**, 345, 7-F1 (1983) (Abstr. in **266**, 902, 38-B11)
- FORD, W. KENT, JR. The Noninteracting Spiral Pair, NGC 450/UGC 807. *Vera C. Rubin and W. Kent Ford, Jr.* **271**, 556, 95-E5 (1983)
- FORMAN, W. The X-Ray Morphology of Abell 1367. *J. Bechtold, W. Forman, R. Giacconi, C. Jones, J. Schwarz, W. Tucker, and L. Van Speybroeck*. **265**, 26, 12-C7 (1983)
- FORREST, D. J. Gamma-Ray Observational Constraints on the Origin of the Optical Continuum Emission from the White-Light Flare of 1980 July 1. *J. M. Ryan, E. L. Chupp, D. J. Forrest, S. M. Matz, E. Rieger, C. Reppin, G. Kanbach, and G. H. Share*. **272**, L61, 111-B8 (1983)
- FORREST, W. J. Determinations of S III, O IV, and Ne V Abundances in Planetary Nebulae from Infrared Lines. *M. A. Shure, T. Herter, J. R. Houck, D. A. Briotta, Jr., W. J. Forrest, G. E. Gull, and J. F. McCarthy*. **270**, 645, 85-B9 (1983)
- FOTI, G. Destruction of Ice Grains in T Tauri Stars. *G. Strazzulla, V. Pironello, and G. Foti*. **271**, 255, 90-G1 (1983)
- FOUKAL, P. A Thermal Model of Sunspot Influence on Solar Luminosity. *P. Foukal, L. A. Fowler, and M. Livshits*. **267**, 863, 50-B13 (1983)
- FOUNTAIN, W. F. A Study in H $\alpha$  Velocities in NGC 1499, NGC 7000, and IC 1318B/C. *W. F. Fountain, G. A. Gary, and C. R. O'Dell*. **269**, 164, 66-G7 (1983)
- An H $\alpha$  Velocity Study of S252. *W. F. Fountain, G. Allen Gary, and C. R. O'Dell*. **273**, 639, 120-E5 (1983)
- FOWLER, L. A. A Thermal Model of Sunspot Influence on Solar Luminosity. *P. Foukal, L. A. Fowler, and M. Livshits*. **267**, 863, 50-B13 (1983)
- FOWLER, WILLIAM A. Neutron Capture Rates in the  $r$ -Process: The Role of Direct Radiative Capture. *G. J. Mathews, A. Mengoni, F.-K. Thielemann, and William A. Fowler*. **270**, 740, 86-B8 (1983)
- FOX, M. W. Long-Period Variables in the Magellanic Clouds: Supergiants, AGB Stars, Supernova Precursors, Planetary Nebula Precursors, and Enrichment of the Interstellar Medium. *P. R. Wood, M. S. Bessell, and M. W. Fox*. **272**, 99, 102-B8 (1983)
- FRANCO, JOSÉ. Protostellar Rotation: Turbulence and Heating of Molecular Clouds. *José Franco*. **264**, 508, 7-G6 (1983)
- Self-regulated Star Formation in the Galaxy. *José Franco and Donald P. Cox*. **273**, 243, 115-A1 (1983)
- FRAZER, JAMES. Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Baliunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning*. **275**, 752, 145-F7 (1983)
- FREEDMAN, WENDY L. Time Evolution of Disk Galaxies Undergoing Stochastic Self-propagating Star Formation.

- Wendy L. Freedman and Barry F. Madore. **265**, 140, 13-E11 (1983)
- FREEMAN, K. C. The Chemical Inhomogeneity of M22. *John Norris and K. C. Freeman*. **266**, 130, 28-D5 (1983)
- Survey of Ha Emission in Globular Cluster Red Giants. *C. Cacciari and K. C. Freeman*. **268**, 185, 54-A7 (1983)
- The Kinematics of Globular Clusters in the Large Magellanic Cloud. *K. C. Freeman, Garth Illingworth, and Augustus Oemler, Jr.* **272**, 488, 107-B7 (1983)
- The Chemical Inhomogeneity of M22: Erratum. *John Norris and K. C. Freeman*. **273**, 837, 122-F6 (1983) (Orig. paper in **266**, 130, 28-D5)
- FRESE, KATHERINE. Formation of Population III Stars and Galaxies with Primordial Planetary-Mass Black Holes. *Katherine Freese, Richard Price, and David N. Schramm*. **275**, 405, 142-A5 (1983)
- FRIER, P. S. The Propagation of Ultraheavy Cosmic Ray Nuclei. *N. R. Brewster, P. S. Frier, and C. J. Waddington*. **264**, 324, 4-D3 (1983)
- FRENCH, HOWARD B. On the Association of Galaxies and QSOs. *Howard B. French and James E. Gunn*. **269**, 29, 65-C10 (1983)
- The Abundance of Carbon in Planetary Nebulae. *Howard B. French*. **273**, 214, 114-E5 (1983)
- FRENK, CARLOS S. Nonlinear Evolution of Large-Scale Structure in the Universe. *Carlos S. Frenk, Simon D. White, and Marc Davis*. **271**, 417, 94-A5 (1983)
- Clustering in a Neutrino-dominated Universe. *Simon D. M. White, Carlos S. Frenk, and Marc Davis*. **274**, L1, 129-A2 (1983)
- FRERKING, M. A. Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wootten, C. Masson, and M. A. Frerking*. **273**, 633, 120-D13 (1983)
- FRIBERG, PER. Observations of Sulfur Dioxide in the Kleinmann-Low Nebula. *F. Peter Schloerb, Per Friberg, Åke Hjalmarson, Bertil Höglund, and William M. Irvine*. **264**, 161, 2-F1 (1983)
- FRIED, JOSEF W. Jets from Young Stars. *Reinhard Mundt and Josef W. Fried*. **274**, L83, 136-C8 (1983)
- FRIED, ROBERT E. Discovery of Eclipses in the X-Ray Source HD 155638. *Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry*. **270**, L79, 87-D8 (1983)
- FRIEDMAN, H. H0547-14: X-Ray Flux from a Weak Gamma-Ray Burst? *C. Ambruster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman*. **269**, 779, 75-A6 (1983)
- FRIEND, DAVID B. Stellar Winds Driven by Multiline Scattering. *David B. Friend and John I. Castor*. **272**, 259, 103-G3 (1983)
- FRISCH, P. C. Synthesis Maps of Ultraviolet Observations of Neutral Interstellar Gas. *P. C. Frisch and D. G. York*. **271**, L59, 100-B3 (1983)
- FROGEL, JAY A. Photometric Studies of Composite Stellar Systems. V. Infrared Photometry of Star Clusters in the Magellanic Clouds. *S. E. Persson, M. Aaronson, Judith G. Cohen, Jay A. Frogel, and K. Matthews*. **266**, 105, 28-B2 (1983)
- Infrared Light Curves of Type I Supernovae. II. Late Stages. *J. H. Elias and Jay A. Frogel*. **268**, 718, 61-A9 (1983)
- A Comment on Red Supergiant Variables in the SMC. *Jay A. Frogel*. **272**, 116, 102-C11 (1983)
- The Evolutionary State and Pulsation Characteristics of Red Variables in Globular Clusters. *Jay A. Frogel*. **272**, 167, 102-G6 (1983)
- Faint Stellar Photometry in Clusters. I. NGC 2204 and E3. *Jay A. Frogel and Bruce A. Twarog*. **274**, 270, 126-F11 (1983)
- Evidence for Two Discrete Epochs of Star Formation in the Large Magellanic Cloud. *Jay A. Frogel and V. M. Blanco*. **274**, L57, 136-A13 (1983)
- An Infrared Search for Luminous Stars in the Bar West Field of the Large Magellanic Cloud. *Jay A. Frogel and Harvey B. Richer*. **275**, 84, 138-A1 (1983)
- Globular Cluster Giant Branches and the Metallicity Scale. *Jay A. Frogel, Judith G. Cohen, and S. E. Persson*. **275**, 773, 146-A9 (1983)
- Infrared Photometry, Bolometric Luminosities, and Effective Temperatures for Giant Stars in 26 Globular Clusters. *Jay A. Frogel, S. E. Persson, and Judith G. Cohen*. **53**, 713, 26-B9 (1983) (Abstr. in **273**, 841, 122-F11)
- FROST, K. J. Millisecond Time Variations in Hard X-Ray Solar Flares. *Alan L. Kiplinger, B. R. Dennis, A. Gordon Emslie, K. J. Frost, and L. E. Orwig*. **265**, L99, 26-E11 (1983)
- Recurrent Pulse Trains in the Solar Hard X-Ray Flare of 1980 June 7. *Alan L. Kiplinger, B. R. Dennis, K. J. Frost, and L. E. Orwig*. **273**, 783, 122-B6 (1983)
- FRY, J. N. A New Evaluation of the Four-Point Galaxy Correlation Function Amplitudes. *J. N. Fry*. **267**, 483, 46-B9 (1983)
- Correlation Functions in a Filamentary Clustering Prescription. *J. N. Fry*. **270**, L31, 87-A4 (1983)
- FTACLAS, C. Hot Spots on Neutron Stars: The Near-Field Gravitational Lens. *K. R. Pechenick, C. Ftacclas, and J. M. Cohen*. **274**, 846, 134-E8 (1983)
- FTACLAS, CHRIST. The Intrinsic Shape of cD Galaxies. *Christ Ftacclas and Mitchell F. Struble*. **274**, 521, 130-F14 (1983)
- FUJIMOTO, M. A Bisymmetric Spiral Magnetic Field and the Spiral Arms in Our Galaxy. *Y. Sofue and M. Fujimoto*. **265**, 722, 20-E12 (1983)
- FUKUI, Y. Molecular Emission Which Is Probably Localized within the Central 10 Parsecs of the Galaxy. *Y. Fukui, H. Ogawa, and S. Deguchi*. **275**, L55, 148-C9 (1983)
- FURNISS, I. IR Maps of M17 in the [O III] 88 Micron and 52 Micron Lines and [N III] 57 Micron Line Measurements. *R. J. Emery, D. A. Naylor, B. Fitton, I. Furniss, R. E. Jennings, and K. J. King*. **268**, 721, 61-A12 (1983)
- GAETZ, T. J. Line Radiation from a Hot, Optically Thin Plasma: Collision Strengths and Emissivities. *T. J. Gaetz and E. E. Salpeter*. **52**, 155, 11-D9 (1983) (Abstr. in **268**, 906, 63-A9)
- GAFFET, BERNARD. Semianalytical Treatment of the Hydrodynamics of Supernova Remnants during the Snowplow Phase. *Bernard Gaffet*. **273**, 267, 115-B11 (1983)
- GAIZAUSKAS, V. Large-Scale Patterns Formed by Solar Active Regions during the Ascending Phase of Cycle 21. *V. Gaizauskas, K. L. Harvey, J. W. Harvey, and C. Zwaan*. **265**, 1056, 24-C8 (1983)
- GAIZAUSKAS, VICTOR. Very Large Array Observations of Solar Active Regions. III. Multiple Wavelength Observations. *Kenneth R. Lang, Robert F. Willson, and Victor Gaizauskas*. **267**, 455, 44-F12 (1983)
- GALLAGHER, J. S. Gas Kinematics and the Structures of Extragalactic Giant and Supergiant H II Regions. *J. S. Gallagher and Deidre A. Hunter*. **274**, 141, 125-D7 (1983)
- GALLAGHER, JAY. Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. *John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson*. **274**, 125, 125-C5 (1983)
- GALLOWAY, D. J. Accreting X-Ray Pulsar Atmospheres Heated by Coulomb Deceleration of Protons. *P. Mészáros, A. K. Harding, J. G. Kirk, and D. J. Galloway*. **266**, L33, 32-C3 (1983)
- GANZEL, B. L. An Energetic, Bisymmetrically Expanding H I Remnant. *Felix J. Lockman and B. L. Ganzel*. **268**, 117, 53-B11 (1983)
- GARAY, G. Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck*. **271**, L31,

- 93-C3 (1983)
- GARAY, GUIDO. The Galactic Gradient in Electron Temperature from Observations of Low-Density H II Regions. *Guido Garay and Luis F. Rodríguez*. **266**, 263, 29-G1 (1983)
- GARCIA, M. Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704 + 241. *M. Garcia, S. L. Balunas, R. Duxey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson*. **267**, 291, 43-A13 (1983)
- GARCIA-BARRETO, J. A. 5 GHz Observations of Sources in the Arecibo 611 MHz Survey. *C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke*. **51**, 67, 2-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- 5 GHz Observations of Sources in the Arecibo 611 MHz Survey: Erratum. *C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke*. **52**, 182, 11-G4 (1983) (Orig. paper in **51**, 67, 2-A1)
- GARCIA-MUNOZ, M. The Anomalous Helium Component in the Heliosphere: The 1965 versus the 1972-1977 Solar Minimum. *M. Garcia-Munoz, K. R. Pyle, and J. A. Simpson*. **274**, L93, 136-D11 (1983)
- A Quantitative Test of Solar Modulation Theory: The Proton, Helium, and Electron Spectra from 1965 through 1979. *P. Evenson, M. Garcia-Munoz, P. Meyer, K. R. Pyle, and J. A. Simpson*. **275**, L15, 141-F14 (1983)
- GARMANY, CATHARINE D. The Evolution of Massive Stars: The Numbers and Distribution of O Stars and Wolf-Rayet Stars. *Peter S. Conti, Catharine D. Garmany, C. de Loore, and D. Vanbeveren*. **274**, 302, 127-B3 (1983)
- GARMIRE, G. P. The Central X-Ray Source in RCW 103: Evidence for Blackbody Emission. *I. R. Tuohy, G. P. Garmire, R. N. Manchester, and M. A. Dopita*. **268**, 778, 61-E14 (1983)
- HEAO A-2 Soft X-Ray Source Catalog. *J. J. Nugent, K. A. Jensen, J. A. Nousek, G. P. Garmire, K. O. Mason, F. M. Walter, C. S. Bowyer, R. A. Stern, and G. R. Riegler*. **51**, 1, 1-A2 (1983) (Abstr. in **263**, 1007, 142-F8)
- GARRARD, T. L. Cosmic-Ray Abundances of Sn, Te, Xe, and Ba Nuclei Measured on HEAO 3. *W. R. Binns, R. K. Finkle, T. L. Garrard, M. H. Israel, J. Klarmann, K. E. Krombel, E. C. Stone, and C. J. Waddington*. **267**, L93, 51-B12 (1983)
- GARRETT, D. B. The QSO 1156 + 295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- GARRISON, R. F. UVB Photometry for Southern OB Stars. *R. E. Schild, R. F. Garrison, and W. A. Hiltner*. **51**, 321, 7-A2 (1983) (Abstr. in **266**, 903, 38-B12)
- Massive Eclipsing Binary Candidates. *R. F. Garrison, R. E. Schild, and W. A. Hiltner*. **52**, 1, 9-A2 (1983) (Abstr. in **267**, 892, 50-D14)
- GARY, DALE E. Microwave Emission from the Coronae of Late-Type Dwarf Stars. *Jeffrey L. Linsky and Dale E. Gary*. **274**, 776, 133-G5 (1983)
- GARY, G. A. A Study in H $\alpha$  Velocities in NGC 1499, NGC 7000, and IC 1318/B. *W. F. Fountain, G. A. Gary, and C. R. O'Dell*. **269**, 164, 66-G7 (1983)
- GARY, G. ALLEN. An H $\alpha$  Velocity Study of S252. *W. F. Fountain, G. Allen Gary, and C. R. O'Dell*. **273**, 639, 120-E5 (1983)
- GASKELL, C. MARTIN. PKS 0119-046 and the Origin of Infalling Absorption-Line Systems in Quasars. *C. Martin Gaskell*. **267**, L1, 45-B2 (1983)
- GASTON, BARBARA. Luminosity Function of High-Redshift Quasars. *Barbara Gaston*. **272**, 411, 106-C5 (1983)
- GATLEY, I. Observations of the Extinction and Excitation of the Molecular Hydrogen Emission in Orion. *S. Beckwith, Neal J. Evans II, I. Gatley, G. Gull, and R. W. Russell*. **264**, 152, 2-E6 (1983)
- GATLEY, IAN. Submillimeter Extensions of the Solar Limb Determined from Observations of the Total Eclipse of 1982 July 31. *C. Lindsey, E. E. Becklin, J. T. Jefferies, F. Q. Orrall, M. W. Werner, and Ian Gatley*. **264**, L25, 5-B9 (1983)
- Infrared Observations of OB Star Formation in NGC 6334. *Paul M. Harvey and Ian Gatley*. **269**, 613, 73-B5 (1983)
- Type II OH/IR Masers. III. The Data Base. *Terry J. Jones, A. R. Hyland, and Ian Gatley*. **273**, 660, 120-G2 (1983)
- OH/IR Masers. IV. Evolution, Pulsation, and Nature of the Sources. *Terry J. Jones, A. R. Hyland, P. R. Wood, and Ian Gatley*. **273**, 669, 121-A1 (1983)
- The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams*. **274**, 168, 125-F6 (1983)
- GAVAZZI, G. Radio and X-Ray Observations of the Radio Halo Source in A1367. *G. Gavazzi and G. Trinchieri*. **270**, 410, 82-E12 (1983)
- GEAR, W. K. Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low*. **273**, 58, 112-F10 (1983)
- GEBALLE, T. R. Identification of the Emission Features near 3.5 Microns in the Pre-Main-Sequence Star HD 97048. *F. Baas, L. J. Allamandola, T. R. Geballe, S. E. Persson, and J. H. Lacy*. **265**, 290, 15-C8 (1983)
- GEHRZ, R. D. Star Bursts and the Extraordinary Galaxy NGC 3690. *R. D. Gehrz, R. A. Sramek, and D. W. Weedman*. **267**, 551, 46-G7 (1983)
- The Stellar Component of the Galaxy as Seen by the AFGL Infrared Sky Survey. *Gary L. Grasdalen, R. D. Gehrz, J. A. Hackwell, M. Castelaz, and G. Gullixson*. **53**, 413, 22-B7 (1983) (Abstr. in **272**, 787, 110-C12)
- GEISLER, DOUGLAS. The Age and Composition of the LMC Red Globular Cluster NGC 2121. *Phillip Flower, Douglas Geisler, Paul Hodge, Edward Olszewski, and Robert Schommer*. **275**, 15, 137-B7 (1983)
- GELDZAHLE, B. J. Absence of Pulsar Ghost Remnants. *N. L. Chen, W. D. Cotton, E. J. Geldzahler, and J. M. Marcaide*. **264**, 273, 3-G4 (1983)
- Radio Frequency Observations of Galactic X-Ray Sources. *B. J. Geldzahler*. **264**, L49, 11-B6 (1983)
- The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35$  c. *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming*. **273**, L65, 123-B3 (1983)
- Limits to the Rate of Component Separation in Scorpius X-1. *E. B. Fomalont, B. J. Geldzahler, R. M. Hjellming, and C. M. Wade*. **275**, 802, 146-C11 (1983)
- GELLER, M. J. Groups of Galaxies. III. The CfA Survey. *M. J. Geller and J. P. Huchra*. **52**, 61, 10-A2 (1983) (Abstr. in **268**, 906, 63-A9)
- GELLER, MARGARET J. Galaxy Clusters with Multiple Components. II. Abell 115. *Timothy C. Beers, John P. Huchra, and Margaret J. Geller*. **264**, 356, 6-B12 (1983)
- The Cancer Cluster: An Unbound Collection of Groups. *Gregory D. Bothun, Margaret J. Geller, Timothy C. Beers, and John P. Huchra*. **268**, 47, 52-D10 (1983)
- First-ranked Galaxies in Groups. *Margaret J. Geller and Marc Postman*. **274**, 31, 124-C8 (1983)
- Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and



- Infrared Observations of NGC 4214 and NGC 4670. *John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson.* **274**, 125, 125-C5 (1983)
- The Environment of D and cD Galaxies. *Timothy C. Beers and Margaret J. Geller.* **274**, 491, 130-D11 (1983)
- GENZEL, R. Detection of Interstellar NH<sub>3</sub> in the Far-Infrared: Warm and Dense Gas in Orion-KL. *C. H. Townes, R. Genzel, Dan M. Watson, and J. W. V. Storey.* **269**, L11, 69-A12 (1983)
- Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck.* **271**, L31, 93-C3 (1983)
- GENZEL, REINHARD. VLA Observations of Warm NH<sub>3</sub> Associated with Mass Outflows in W51. *Paul T. P. Ho, Reinhard Genzel, and Aniruddha Das.* **266**, 596, 34-F14 (1983)
- GENZEL, REINHARD L. A Far-Infrared Study of the N/O Abundance Ratio in Galactic H II Regions. *Daniel F. Lester, Harriet L. Dinerstein, Michael W. Werner, Dan M. Watson, and Reinhard L. Genzel.* **271**, 618, 96-C6 (1983)
- GERGELY, T. E. A Coronal Transient Associated with a High-Speed Type II Burst. *T. E. Gergely, M. R. Kundu, and E. Hildner.* **268**, 403, 56-C6 (1983)
- Direct Evidence of Type III Electron Streams Propagating in Coronal Streamers. *M. R. Kundu, T. E. Gergely, P. J. Turner, and R. A. Howard.* **269**, L67, 76-C11 (1983)
- GEROLA, HUMBERTO. Dwarf Elliptical Galaxies. *Humberto Gerola, Paolo Carnevali, and E. E. Salpeter.* **268**, L75, 63-E6 (1983)
- GHIGO, F. Optical and Radio Structure of the Quasar PKS 0812+02. *S. Wyckoff, K. Johnston, F. Ghigo, L. Rudnick, P. Wehinger, and A. Boksenberg.* **265**, 43, 12-E4 (1983)
- GIACCONI, R. The X-Ray Morphology of Abell 1367. *J. Bechtold, W. Forman, R. Giacconi, C. Jones, J. Schwarz, W. Tucker, and L. Van Speybroeck.* **265**, 26, 12-C7 (1983)
- The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin.* **269**, 375, 70-E2 (1983)
- GIALONGO, E. Quasar Evolution and Gravitational Collapse. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti.* **269**, 57, 65-E10 (1983)
- Quasar Evolution and Gravitational Collapse: Erratum. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti.* **273**, 837, 122-F6 (1983) (Orig. paper in **269**, 57, 65-E10)
- GIAMPAPA, MARK S. The Magnetic Field on the RS Canum Venaticorum Star Lambda Andromedae. *Mark S. Giampapa, Leon Golub, and Simon P. Worden.* **268**, L121, 63-A10 (1983)
- GIBSON, D. M. On the Microwave Emission from Comets: Erratum. *D. M. Gibson and R. W. Hobbs.* **269**, 805, 75-C4 (1983) (Orig. paper in **248**, 863, 91-A1)
- GIBSON, DAVID M. First Observations of Stellar Coronal Structure: The Coronae of AR Lacertae. *Frederick M. Walter, David M. Gibson, and Gabor S. Basri.* **267**, 665, 48-A13 (1983)
- GILES, A. B. *see* LAWRENCE, A., *et al.*
- GILMAN, PETER A. Dynamically Consistent Nonlinear Dynamos Driven by Convection in a Rotating Spherical Shell. II. Dynamos with Cycles and Strong Feedbacks. *Peter A. Gilman.* **53**, 243, 20-A2 (1983) (Abstr. in **272**, 784, 110-C9)
- GINGOLD, R. A. On Tidal Detonation of Stars by Massive Black Holes. *G. V. Bicknell and R. A. Gingold.* **273**, 749, 121-F13 (1983)
- GIOIA, I. M. The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger.* **266**, L73, 39-A4 (1983)
- The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. *John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Maccacaro, I. J. Danziger, D. Kunth, and J. Lub.* **273**, 458, 118-D12 (1983)
- GIOIA, ISABELLA M. VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. *Isabella M. Gioia, E. D. Feigelson, T. Maccacaro, R. Schild, and G. Zamorani.* **271**, 524, 95-C1 (1983)
- GIOMMI, P. The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger.* **266**, L73, 39-A4 (1983)
- GIOVANARDI, C. Effects of Environment on Neutral Hydrogen Distribution for Disk Galaxies in the Virgo Cluster Area. *C. Giovanardi, George Helou, E. E. Salpeter, and Nathan Krumm.* **267**, 35, 40-C13 (1983)
- GIOVANELLI, R. Neutral Hydrogen in X-Ray Cluster Galaxies: A1367. *Guido L. Chincarini, R. Giovanelli, M. Haynes, and P. Fontanelli.* **267**, 511, 46-D9 (1983)
- GIOVANELLI, RICCARDO. 21 Centimeter Observations of Supercluster Galaxies: The Bridge between Coma and A1367. *Guido L. Chincarini, Riccardo Giovanelli, and Martha P. Haynes.* **269**, 13, 65-B4 (1983)
- Neutral Hydrogen in Isolated Galaxies. III. The Redshift Distribution. *Martha P. Haynes and Riccardo Giovanelli.* **275**, 472, 142-F3 (1983)
- GIULIANI, J. L., JR. Mass Loss from Evolved Stars. II. Radio Continuum Emission and Evolution to Planetary Nebulae. *D. N. Spergel, J. L. Giuliani, Jr., and G. R. Knapp.* **275**, 330, 140-E10 (1983)
- GIURICIN, G. General Properties of Algol Binaries. *G. Giuricin, F. Madirossian, and M. Mezzetti.* **52**, 35, 9-E1 (1983) (Abstr. in **267**, 892, 50-D14)
- GLACCUM, W. Far-Infrared and Submillimeter Observations of Stellar Radiative and Wind Heating in S140 IRS. *P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles.* **271**, 625, 96-C13 (1983)
- Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. G'ar, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low.* **273**, 58, 112-F10 (1983)
- Far-Infrared Observations of the Type 1 Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith.* **274**, 571, 131-E1 (1983)
- GLADSTONE, G. RANDALL. An Analysis of the Reflection Spectrum of Jupiter from 1500 Å to 1740 Å. *G. Randall Gladstone and Yuk L. Yung.* **266**, 415, 31-D6 (1983)
- GLASNER, A. The Luminosity-Core Mass Relation: Why and How. *Y. Tuchman, A. Glasner, and Z. Barkat.* **268**, 356, 55-G1 (1983)
- GLASS, EDWARD N. The Radial Oscillations of Neutron Stars. *Edward N. Glass and Lee Lindblom.* **53**, 93, 17-G13 (1983) (Abstr. in **271**, 892, 99-B14)
- GLASS, I. S. *see* LAWRENCE, A., *et al.*
- GLASSGOLD, A. E. Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea.* **274**, 101, 125-A9 (1983)
- GLENAR, D. A. Diode Laser Heterodyne Observations of Silicon Monoxide in Sunspots: A Test of Three Sunspot Models. *D. A. Glenar, D. Deming, D. E. Jennings, T. Kostiuik, and M. J. Mumma.* **269**, 309, 68-E4 (1983)
- GLOECKLER, G. Temporal Variations of Nucleonic Abundances



- in Solar Flare Energetic Particle Events. I. Well-connected Events. *G. M. Mason, G. Gloeckler, and D. Hovestadt.* **267**, 844, 50-A8 (1983)
- GODFREY, C. P. The Galactic Gamma-Ray Source Population. *C. P. Godfrey.* **268**, 111, 53-B5 (1983)
- GODFREY, PETER. Vibrationally Excited  $\text{CH}_3\text{CN}$  and  $\text{HC}_3\text{N}$  in Orion. *Paul F. Goldsmith, Robert Krotkov, Ronald L. Snell, R. D. Brown, and Peter Godfrey.* **274**, 184, 125-G8 (1983)
- GOEBEL, J. H. Observation of Ice Mantles toward HD 29647. *J. H. Goebel.* **268**, L41, 57-D4 (1983)
- The  $\text{C}_2\text{H}$ ,  $\text{C}_2$ , and CN Electronic Absorption Bands in the Carbon Star HD 19557. *J. H. Goebel, J. D. Bregman, D. M. Cooper, D. Goorvitch, S. R. Langhoff, and F. C. Witteborn.* **270**, 190, 79-A7 (1983)
- The Detection of  $\text{H}_2$  in Cool Carbon Stars. *H. R. Johnson, J. H. Goebel, D. Goorvitch, and S. T. Ridgway.* **270**, L63, 87-C9 (1983)
- Observations of NGC 7027 from 5.2 to 7.5 Microns: The Detection of Ni II and Additional Dust Features. *J. D. Bregman, H. L. Dinerstein, J. H. Goebel, D. F. Lester, F. C. Witteborn, and D. M. Rank.* **274**, 666, 132-F7 (1983)
- GOLDSMITH, P. F. The  $[\text{HCO}^+]/[\text{HOC}^+]$  Abundance Ratio in Molecular Clouds. *R. C. Woods, C. S. Gudean, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarson, L.-Å. Nyman, and H. Olofsson.* **270**, 583, 84-D14 (1983)
- GOLDSMITH, PAUL F. Molecular Gas in the W33 Region. *Paul F. Goldsmith and Xin-Jie Mao.* **265**, 791, 21-D2 (1983)
- Vibrationally Excited  $\text{CH}_3\text{CN}$  and  $\text{HC}_3\text{N}$  in Orion. *Paul F. Goldsmith, Robert Krotkov, Ronald L. Snell, R. D. Brown, and Peter Godfrey.* **274**, 184, 125-G8 (1983)
- Curves for Analysis of the Two Lowest Rotational Transitions of Carbon Monoxide Using the Large Velocity Gradient Radiative Transfer Model. *Paul F. Goldsmith, Judith S. Young, and William D. Langer.* **51**, 203, 4-C1 (1983) (Abstr. in **264**, 748, 10-D12)
- GOLISCH, W. F. The H I Absorption in NGC 5128 (Centaurus A). *J. M. van der Hulst, W. F. Golisch, and A. D. Haschick.* **264**, L37, 11-A9 (1983)
- GOLUB, L. Einstein Observations of X-Ray Emission from A Stars. *L. Golub, F. R. Harnden, Jr., C. W. Maxson, R. Rosner, G. S. Vaiana, Webster Cash, Jr., and Theodore P. Snow, Jr.* **271**, 264, 90-G11 (1983)
- GOLUB, LEON. Coordinated Einstein and IUE Observations of a Disparitions Brusques Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana.* **267**, 280, 43-A1 (1983)
- The Magnetic Field on the RS Canum Venaticorum Star Lambda Andromedae. *Mark S. Giampapa, Leon Golub, and Simon P. Worden.* **268**, L121, 63-A10 (1983)
- Bright, Rapid, Highly Polarized Radio Spikes from the M Dwarf AD Leonis. *Kenneth R. Lang, Jay Bookbinder, Leon Golub, and Michael M. Davis.* **272**, L15, 105-E8 (1983)
- GOMBOSI, T. I. Charge Exchange in Solar Wind-Cometary Interactions. *T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy.* **268**, 889, 62-G1 (1983)
- Charge Exchange in Solar Wind-Cometary Interactions: Erratum. *T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy.* **274**, 919, 135-D14 (1983) (Orig. paper in **268**, 889, 63-A1)
- GOMER, RICHARD. The Correlated X-Ray and Optical Time Variability of TT Arietis. *K. A. Jensen, France A. Córdova, J. Middleditch, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer.* **270**, 211, 79-B14 (1983)
- GOOD, J. SiO Isotopic Maser Emission from VY Canis Majoris. *S. Deguchi, J. Good, Y. Fan, X. Mao, D. Wang, and Nobuharu Ukita.* **264**, L65, 11-C8 (1983)
- GOODMAN, JEREMY. Core Collapse with Strong Encounters. *Jeremy Goodman.* **270**, 700, 85-F10 (1983)
- GOODRICH, ROBERT W. Mrk 744 and Mrk 1066: Two Seyfert Galaxies with Strong Absorption-Line Spectra. *Robert W. Goodrich and Donald E. Osterbrock.* **269**, 416, 71-A9 (1983)
- GOORVITCH, D. The  $\text{C}_2\text{H}$ ,  $\text{C}_2$ , and CN Electronic Absorption Bands in the Carbon Star HD 19557. *J. H. Goebel, J. D. Bregman, D. M. Cooper, D. Goorvitch, S. R. Langhoff, and F. C. Witteborn.* **270**, 190, 79-A7 (1983)
- The Detection of  $\text{H}_2$  in Cool Carbon Stars. *H. R. Johnson, J. H. Goebel, D. Goorvitch, and S. T. Ridgway.* **270**, L63, 87-C9 (1983)
- GORDON, BRUCE E. Collisional Damping of Surface Waves in the Solar Corona. *Bruce E. Gordon and Joseph V. Hollweg.* **266**, 373, 31-A5 (1983)
- GORDON, M. A. CO Emission in Directions of Some Millimeter Wavelength Continuum Sources. *A. G. Kislyakov and M. A. Gordon.* **265**, 766, 21-B5 (1983)
- GORECKI, A. High-Energy X-Ray Observations of Vela X-1. *M. Bautz, S. Howe, A. Gorecki, F. Lang, A. Levine, F. Primini, and W. H. G. Lewin.* **266**, 794, 37-A8 (1983)
- GORENSTEIN, P. The Mass of Tycho's Supernova Remnant as Determined from a High-Resolution X-Ray Map. *F. Seward, P. Gorenstein, and W. Tucker.* **266**, 287, 30-A14 (1983)
- Further Evidence for M87's Massive, Dark Halo. *D. Fabricant and P. Gorenstein.* **267**, 535, 46-F5 (1983)
- Goss, W. M. Distance to the 1.5 Millisecond Pulsar and Other 4C 21.53 Objects. *Carl Heiles, Shrinivas R. Kulkarni, Mary A. Stevens, D. C. Backer, M. M. Davis, and W. M. Goss.* **273**, L75, 123-B11 (1983)
- GOTT, J. RICHARD, III. Filamentary Galaxy Clustering: A Mapping Algorithm. *J. E. Moody, Edwin L. Turner, and J. Richard Gott III.* **273**, 16, 112-B7 (1983)
- GOTTESMAN, S. T. VLA Observations of the Neutral Hydrogen Content of NGC 185 and NGC 205. *Douglas W. Johnson and S. T. Gottesman.* **275**, 549, 143-D14 (1983)
- GOTTLIEB, C. A. Laboratory and Astronomical Measurement of the Millimeter Wave Spectrum of the Ethynyl Radical CCH. *C. A. Gottlieb, E. W. Gottlieb, and P. Thaddeus.* **264**, 740, 10-D4 (1983)
- Laboratory Detection of the  $\text{C}_3\text{N}$  and  $\text{C}_3\text{H}$  Free Radicals. *C. A. Gottlieb, E. W. Gottlieb, P. Thaddeus, and H. Kawamura.* **275**, 916, 147-E3 (1983)
- GOTTLIEB, E. W. Laboratory and Astronomical Measurement of the Millimeter Wave Spectrum of the Ethynyl Radical CCH. *C. A. Gottlieb, E. W. Gottlieb, and P. Thaddeus.* **264**, 740, 10-D4 (1983)
- Laboratory Detection of the  $\text{C}_3\text{N}$  and  $\text{C}_3\text{H}$  Free Radicals. *C. A. Gottlieb, E. W. Gottlieb, P. Thaddeus, and H. Kawamura.* **275**, 916, 147-E3 (1983)
- GOTTWALD, M. Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills.* **274**, 231, 126-C13 (1983)
- GOULD, ROBERT J. Galactic Absorption of High-Energy Gamma-Rays from Cygnus X-3. *Robert J. Gould.* **274**, L23, 129-B7 (1983)
- GRADY, C. A. Observations of Of-Star Wind Variability. *C. A. Grady, T. P. Snow, Jr., and J. G. Timothy.* **271**, 691, 97-A13 (1983)
- GRAFF, M. M. Resonant and Nonresonant Processes in the Formation of  $\text{CH}^+$  by Radiative Association. *M. M. Graff, J. T. Moseley, and E. Roueff.* **269**, 796, 75-B9 (1983)
- GRAHAM, J. A. The Transitory Nature of the Filaments in NGC 5128 (Centaurus A). *J. A. Graham.* **269**, 440, 71-C7 (1983)
- Herbig-Haro Objects in the Dust Globule ESO 210-6A. *J. A. Graham and J. H. Elias.* **272**, 615, 108-E2 (1983)

- Shell Structure in NGC 5128. *D. F. Malin, P. J. Quinn, and J. A. Graham.* **272**, L5, 105-D6 (1983)
- GRANDI, STEVEN A. Reddening Indicators for Quasars and Seyfert I Galaxies. *Steven A. Grandi.* **268**, 591, 59-D13 (1983)
- Narrow-Band Photometric Periods in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi.* **269**, 605, 73-A11 (1983)
- Magnetism in the AM Herculis Variable CW 1103+254. *Gary D. Schmidt, H. S. Stockman, and Steven A. Grandi.* **271**, 735, 97-E1 (1983)
- Precession Instability in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi.* **273**, 697, 121-C2 (1983)
- GRASDALEN, GARY L. Infrared Photometry and Mass Loss Rates for Of-Type Stars. *Paolo Persi, Marco Ferrari-Toniolo, and Gary L. Grasdalen.* **269**, 625, 73-C5 (1983)
- Photoelectric UVB Surface Photometry of NGC 205. *Jill S. Price and Gary L. Grasdalen.* **275**, 559, 143-F1 (1983)
- The Stellar Component of the Galaxy as Seen by the AFGL Infrared Sky Survey. *Gary L. Grasdalen, R. D. Gehrz, J. A. Hackwell, M. Castetaz, and C. Gullixson.* **53**, 413, 22-B7 (1983) (Abstr. in **272**, 787, 110-C12)
- GRASER, U. Search for Pulsed Gamma-Ray Emission at MeV Energies from 24 Radio Pulsars. *U. Graser and V. Schönfelder.* **273**, 681, 121-A13 (1983)
- GRATTON, RAFFAELE G. H $\alpha$  Emission and Mass Loss from Metal-poor Giants. *Raffaele G. Gratton.* **264**, 223, 3-C9 (1983)
- GRAUER, A. D. The Correlated X-Ray and Optical Time Variability of TT Arietis. *K. A. Jensen, France A. Córdova, J. Middledich, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer.* **270**, 211, 79-B14 (1983)
- GRAUER, ALBERT D. The Precataclysmic Nucleus of Abell 41. *Albert D. Grauer and Howard E. Bond.* **271**, 259, 90-G5 (1983)
- GRAVINA, R. The Emission Spectrum of Yttrium Monoxide: New Rotational and Vibrational Results on the A<sup>2</sup>II-X<sup>2</sup>Σ<sup>+</sup> System. *A. Bernard and R. Gravina.* **52**, 443, 16-D1 (1983) (Abstr. in **270**, 780, 86-E7)
- GREEN, RICHARD F. Two Hot, Low-Field Magnetic DA White Dwarfs. *James Liebert, Gary D. Schmidt, Richard F. Green, H. S. Stockman, and John T. McGraw.* **264**, 262, 3-F7 (1983)
- Spectroscopy of Variable Blue Stellar Objects. *Peter D. Usher, Archibald Warnock III, and Richard F. Green.* **269**, 73, 65-F12 (1983)
- Quasar Evolution Derived from the Palomar Bright Quasar Survey and Other Complete Quasar Surveys. *Maarten Schmidt and Richard F. Green.* **269**, 352, 70-B9 (1983)
- GREEN, S. Collisional Rates for Vibrational-Rotational Transitions in Circumstellar SiO Masers: Erratum. *R. J. Bieniek and S. Green.* **270**, L101, 87-F9 (1983) (Orig. paper in **265**, L29, 18-F12)
- GREEN, SHELTON. Collisional Rates for Vibrational-Rotational Transitions in Circumstellar SiO Masers. *Ronald J. Bieniek and Sheldon Green.* **265**, L29, 18-F12 (1983)
- The Kinetic Temperature and Density of the Sagittarius Molecular B2 Cloud from Observations of Methyl Cyanide. *Sally E. Cummins, Sheldon Green, P. Thaddeus, and R. A. Linke.* **266**, 331, 30-E4 (1983)
- Theoretical Study of Silicon Dicarbide. *Sheldon Green.* **266**, 895, 38-B4 (1983)
- GREENBERG, J. MAYO. Interstellar Polarization, Grain Growth, and Alignment. *Per A. Aannestad and J. Mayo Greenberg.* **272**, 551, 107-G6 (1983)
- A Far-Ultraviolet Extinction Law: What Does It Mean? *J. Mayo Greenberg and Grzegorz Chlewicki.* **272**, 563, 108-A6 (1983)
- GREENFIELD, P. E. 5 GHz Observations of Sources in the Arecibo 611 MHz Survey. *C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke.* **51**, 67, 2-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- 5 GHz Observations of Sources in the Arecibo 611 MHz Survey: Erratum. *C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke.* **52**, 182, 11-G4 (1983) (Orig. paper in **51**, 67, 2-A1)
- GREENSTEIN, GEORGE. Pulselike Character of Blackbody Radiation from Neutron Stars. *George Greenstein and Gregory J. Hartke.* **271**, 283, 91-B2 (1983)
- GREENSTEIN, JESSE L. Iron and Magnesium in the White Dwarf GD 40: A Test of Diffusion Theory. *Harry L. Shipman and Jesse L. Greenstein.* **266**, 761, 36-E12 (1983)
- A Proposed New White Dwarf Spectral Classification System. *Edward M. Sion, Jesse L. Greenstein, John D. Landstreet, James Liebert, Harry L. Shipman, and Gary A. Wegner.* **269**, 253, 68-A1 (1983)
- GREGORINI, L. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski.* **274**, 62, 124-E11 (1983)
- GREVESSE, N. A Redetermination of the Solar Abundance of Molybdenum. *E. Biémont, N. Grevesse, P. Hannaford, R. M. Lowe, and W. Whaling.* **275**, 889, 147-C4 (1983)
- GRIFFITHS, R. E. The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger.* **266**, L73, 39-A4 (1983)
- The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin.* **269**, 375, 70-E2 (1983)
- The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. *John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Maccacaro, I. J. Danziger, D. Kunth, and J. Lub.* **273**, 458, 118-D12 (1983)
- GRINDLAY, J. E. On Searches for Pulsed Emission with Application to Four Globular Cluster X-Ray Sources: NGC 1851, 6441, 6624, and 6712. *D. A. Leahy, W. Darbro, R. F. Elsner, M. C. Weisskopf, P. G. Sutherland, S. Kahn, and J. E. Grindlay.* **266**, 160, 28-F9 (1983)
- X-Ray Observations of 4U 1626-67 by the Monitor Counter on the Einstein (HEAO 2) Observatory. *R. F. Elsner, W. Darbro, D. Leahy, M. C. Weisskopf, P. G. Sutherland, S. M. Kahn, and J. E. Grindlay.* **266**, 769, 36-F6 (1983)
- The Period History of the X-Ray Pulsar in MSH 15-52. *M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Narayan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward.* **267**, 711, 48-E5 (1983)
- The X-Ray Lobes of SS 433. *M. G. Watson, R. Willingale, J. E. Grindlay, and F. D. Seward.* **273**, 688, 121-B6 (1983)
- X-Ray Observations of LMC X-3 with the Monitor Proportional Counter aboard the HEAO 2 Einstein Observatory: A Comparison with Cygnus X-1. *M. C. Weisskopf, S. M. Kahn, W. D. Darbro, R. F. Elsner, J. E. Grindlay, S. Narayan, P. G. Sutherland, and A. C. Williams.* **274**, L65, 136-B7 (1983)
- GRINDLAY, JONATHAN E. X-Ray Evidence for White Dwarf Binaries in Globular Clusters. *Paul Hertz and Jonathan E. Grindlay.* **267**, L83, 51-B2 (1983)
- Einstein Observations of the Rho Ophiuchi Dark Cloud: An X-Ray Christmas Tree. *Thierry Montmerle, Lydie Koch-Miramond, Edith Falgarone, and Jonathan E. Grindlay.* **269**, 182, 67-A11 (1983)

- An X-Ray Survey of Globular Clusters and Their X-Ray Luminosity Function. *Paul Hertz and Jonathan E. Grindlay*. **275**, 105, 138-B13 (1983)
- GRUBER, D. E. 2-165 keV Observations of Active Galaxies and the Diffuse Background. *R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson*. **269**, 423, 71-B2 (1983)
- GUDEMAN, C. S. The  $[\text{HCO}^+]/[\text{HOC}^+]$  Abundance Ratio in Molecular Clouds. *R. C. Woods, C. S. Gudeman, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarson, L.-Å. Nyman, and H. Olofsson*. **270**, 583, 84-D14 (1983)
- GUDMUNDSSON, E. H. Structure of Neutron Star Envelopes. *E. H. Gudmundsson, C. J. Pethick, and R. I. Epstein*. **272**, 286, 104-B2 (1983)
- GUÉLIN, MICHEL. Detection of  $\text{H}^{13}\text{NN}^+$  and  $\text{HN}^{13}\text{N}^+$  in Interstellar Clouds. *Richard A. Linke, Michel Guélin, and William D. Langer*. **271**, L85, 100-C12 (1983)
- GUENTHER, D. B. Preliminary Observations of Velocity Fields at the Solar Poles. *L. E. Cram, B. R. Durney, and D. B. Guenther*. **267**, 442, 44-E13 (1983)
- GUILBERT, P. W. Why Are Broad Emission Lines Seen in Seyfert Galaxies and Not in BL Lacertae Objects? *P. W. Guilbert, A. C. Fabian, and Richard McCray*. **266**, 466, 33-D6 (1983)
- GUINAN, EDWARD F. The Hot DO White Dwarf HD 149499 B: Einstein Redshift of a DB Progenitor with Carbon Features. *Edward M. Sion and Edward F. Guinan*. **265**, L87, 26-E1 (1983)
- GULL, G. Observations of the Extinction and Excitation of the Molecular Hydrogen Emission in Orion. *S. Beckwith, Neal J. Evans II, I. Gatley, G. Gull, and R. W. Russell*. **264**, 152, 2-E6 (1983)
- GULL, G. E. Detection of Sulfur in the Galactic Center. *T. Herter, D. A. Briotta, Jr., G. E. Gull, M. A. Shure, and J. R. Houck*. **267**, L37, 45-D13 (1983)
- Determinations of S III, O IV, and Ne V Abundances in Planetary Nebulae from Infrared Lines. *M. A. Shure, T. Herter, J. R. Houck, D. A. Briotta, Jr., W. J. Forrest, G. E. Gull, and J. F. McCarthy*. **270**, 645, 85 B9 (1983)
- GULL, T. R. The Structure and Emission Spectrum of a Non-radiative Shock Wave in the Cygnus Loop. *J. C. Raymond, W. P. Blair, R. A. Fesen, and T. R. Gull*. **275**, 636, 144-E3 (1983)
- GULL, THEODORE R. Prominent Ultraviolet Emission Lines from Type I Seyfert Galaxies. *Chi-Chao Wu, Albert Boggess, and Theodore R. Gull*. **266**, 28, 27-C5 (1983)
- High-Velocity Iron Absorption Lines in Supernova Remnant 1006. *Chi-Chao Wu, Marvin Leventhal, Craig L. Sarazin, and Theodore R. Gull*. **269**, L5, 69-A7 (1983)
- Deep [O III] Interference Filter Imagery of the Supernova Remnants G65.3+5.7, G126.2+1.2, CTA 1, and VRO 42.05.01. *Robert A. Fesen and Theodore R. Gull*. **51**, 337, 7-D1 (1983) (Abstr. in **266**, 902, 38-B11)
- GULLIXSON, C. The Stellar Component of the Galaxy as Seen by the AFGL Infrared Sky Survey. *Gary L. Grasdalén, R. D. Gehrz, J. A. Hackwell, M. Castelaz, and C. Gullixson*. **53**, 413, 22-B7 (1983) (Abstr. in **272**, 787, 110-C12)
- GUNN, J. E. Secondary Standard Stars for Absolute Spectrophotometry. *J. B. Oke and J. E. Gunn*. **266**, 713, 36-B4 (1983)
- GUNN, JAMES E. CCD Photometry of Abell Clusters. I. Magnitudes and Redshifts for 84 Brightest Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel*. **264**, 337, 6-A5 (1983)
- CCD Photometry of Abell Clusters. II. Surface Photometry of 249 Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel*. **268**, 476, 58-C2 (1983)
- On the Association of Galaxies and QSOs. *Howard B. French and James E. Gunn*. **269**, 29, 65-C10 (1983)
- Spectroscopy of Galaxies in Distant Clusters. II. The Population of the 3C 295 Cluster. *Alan Dressler and James E. Gunn*. **270**, 7, 77-A12 (1983)
- Stellar Spectrophotometric Atlas, 3130< $\lambda$ <10800 Å. *James E. Gunn and L. L. Stryker*. **52**, 121, 11-A11 (1983) (Abstr. in **268**, 906, 63-A9)
- GURMAN, J. B. Fluid Motions in the Solar Chromosphere-Corona Transition Region. I. Line Widths and Doppler Shifts for C IV. *R. G. Athay, J. B. Gurman, W. Henze, and R. A. Shine*. **265**, 519, 17-F3 (1983)
- Fluid Motions in the Solar Chromosphere-Corona Transition Region. III. Active Region Flows from Wide Slit Dopplergrams. *R. G. Athay, J. B. Gurman, and W. Henze*. **269**, 706, 74-B9 (1983)
- Fluid Motions in the Solar Chromosphere-Corona Transition Region. IV. Mass Motions over Sunspot Umbrae. *J. B. Gurman and R. G. Athay*. **273**, 374, 116-C11 (1983)
- HABER, DEBORAH A. The Propagation of Energetic Ions in Magnetic Loops and Gamma-Ray Emission from Solar Flares. *Ellen G. Zweibel and Deborah A. Haber*. **264**, 648, 9-D2 (1983)
- HACKWELL, J. A. The Stellar Component of the Galaxy as Seen by the AFGL Infrared Sky Survey. *Gary L. Grasdalén, R. D. Gehrz, J. A. Hackwell, M. Castelaz, and C. Gullixson*. **53**, 413, 22-B7 (1983) (Abstr. in **272**, 787, 110-C12)
- HACKWELL, JOHN A. Infrared Mapping and *UBVRi* Photometry of the Spiral Galaxy NGC 1566. *John A. Hackwell and François Schweizer*. **265**, 643, 19-E11 (1983)
- HACYAN, S. Gravitational Instability in the Presence of a Magnetic Field in the Expanding Universe. *S. Hacyan*. **273**, 421, 118-B2 (1983)
- HAGEN, WENDY. The Circumstellar Envelopes and Chromospheres of Cool Giants and Supergiants. *Wendy Hagen, Robert E. Stencel, and Dale F. Dickinson*. **274**, 286, 127-A1 (1983)
- HAISCH, BERNHARD M. Coordinated *Einstein* and *IUE* Observations of a *Disparitions Brusques* Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana*. **267**, 280, 43-A1 (1983)
- HALL, D. N. B. The Circumstellar and Nebular Environment of the Becklin-Neugebauer Object:  $\lambda = 2-5$  Micron Spectroscopy. *N. Scoville, S. G. Kleinmann, D. N. B. Hall, and S. T. Ridgway*. **275**, 201, 139-C3 (1983)
- HALL, DOUGLAS S. Discovery of Eclipses in the X-Ray Source HD 155638. *Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry*. **270**, L79, 87-D8 (1983)
- HALPERN, J. P. Low-Ionization Active Galactic Nuclei: X-Ray or Shock Heated? *J. P. Halpern and J. E. Steiner*. **269**, L37, 76-A12 (1983)
- HAMEURY, J. M. Hard X-Ray Observations of the Crab Nebula and A0535+26 with a High Energy Resolution Spectrometer. *J. M. Hameury, D. Boclet, Ph. Durouchoux, T. L. Cline, W. S. Paciesas, B. J. Teegarden, J. Tueller, and R. C. Haymes*. **270**, 144, 78-D14 (1983)
- HAMILTON, ANDREW J. S. Deceleration of Grand Unified Theory Monopoles in a Plasma. *Andrew J. S. Hamilton and Craig L. Sarazin*. **274**, 399, 128-B2 (1983)
- X-Ray Line Emission from Supernova Remnants. I. Models for Adiabatic Remnants. *Andrew J. S. Hamilton, Craig L. Sarazin, and Roger A. Chevalier*. **51**, 115, 2-E1 (1983) (Abstr. in **263**, 1005, 142-F6)
- HAMMERSCHLAG-HENSBERGE, G. Episodic Mass Loss and Narrow Lines in Gamma Cassiopeiae and in Other Early-Type Stars. *H. F. Henrichs, G. Hammerschlag-Hensberge, I. D. Howarth, and P. Barr*. **268**, 807, 62-A1 (1983)
- HANNAFORD, P. A Redetermination of the Solar Abundance of

- Molybdenum. *E. Biémont, N. Grevesse, P. Hanafor, R. M. Lowe, and W. Whaling.* **275**, 889, 147-C4 (1983)
- HANSEN, C. J. The Pulsation Properties of DB White Dwarfs: A Preliminary Analysis. *D. E. Winget, H. M. Van Horn, M. Tassoul, C. J. Hansen, and G. Fontaine.* **268**, L33, 57-C10 (1983)
- HANSEN, S. S. VLA Observations of the  $2\pi_{3/2}J=3/2$  Masers Associated with Orion A. *S. S. Hansen and K. J. Johnston.* **267**, 625, 47-E13 (1983)
- HANSON, ROBERT B. The Astrometric Position of T Tauri and the Nature of Its Companion. *Robert B. Hanson, B. F. Jones, and D. N. C. Lin.* **270**, L27, 81-B13 (1983)
- HANSON, WAYNE A. Discovery of Eclipses in the X-Ray Source HD 155638. *Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry.* **270**, L79, 87-D8 (1983)
- HARDEE, PHILIP E. Effects of the Kelvin-Helmholtz Surface Instability on Supersonic Jets. *Philip E. Hardee.* **269**, 94, 66-A5 (1983)
- Observations of the M87 Jet at 15 GHz with 0.12 Resolution. *J. A. Biretta, Frazer N. Owen, and Philip E. Hardee.* **274**, L27, 129-B10 (1983)
- HARDING, A. K. Accreting X-Ray Pulsar Atmospheres Heated by Coulomb Deceleration of Protons. *P. Mészáros, A. K. Harding, J. G. Kirk, and D. J. Galloway.* **266**, L33, 32-C3 (1983)
- HARDING, ALICE K. Pair Production in Superstrong Magnetic Fields. *Joseph K. Daugherty and Alice K. Harding.* **273**, 761, 121-G11 (1983)
- HARMON, J. K. Spectral Broadening of Planetary Radar Signals by the Solar Wind. *J. K. Harmon and W. A. Coles.* **270**, 748, 86-C3 (1983)
- HARMS, RICHARD. Paired Quasars near NGC 2639: Evidence for Quasars in Superclusters? *Holland Ford, Robin Ciardullo, and Richard Harms.* **266**, 451, 33-C4 (1983)
- Redshifts of Groups and Clusters in the Rich Superclusters 1451 + 22 and 1615 + 43. *Robin Ciardullo, Holland Ford, Frank Bartko, and Richard Harms.* **273**, 24, 112-C10 (1983)
- HARNDEN, F. R., JR. MSH 15 - 52: A Supernova Remnant Containing Two Compact X-Ray Sources. *F. D. Seward, F. R. Harnden, Jr., P. Murdin, and David H. Clark.* **267**, 698, 48-D4 (1983)
- The Period History of the X-Ray Pulsar in MSH 15 - 52. *M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Narayan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward.* **267**, 711, 48-E5 (1983)
- Einstein Observations of X-Ray Emission from A Stars. *L. Golub, F. R. Harnden, Jr., C. W. Maxson, R. Rosner, G. S. Vaiana, Webster Cash, Jr., and Theodore P. Snow, Jr.* **271**, 264, 90-G11 (1983)
- HARPER, D. A. Far-Infrared and Submillimeter Observations of Stellar Radiative and Wind Heating in S140 IRS. *P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles.* **271**, 625, 96-C13 (1983)
- Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low.* **273**, 58, 112-F10 (1983)
- Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith.* **274**, 571, 131-E1 (1983)
- Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. *Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic.* **274**, L43, 129-D3 (1983)
- HARRINGTON, J. PATRICK. The Planetary Nebula IC 3568: A Model Based on IUE Observations. *J. Patrick Harrington and Walter A. Feibelman.* **265**, 258, 15-A4 (1983)
- HARRIS, ANDREW. Small Rotating Clouds of Stellar Mass in Orion Molecular Cloud I. *Andrew Harris, C. H. Townes, D. N. Matsakis, and Patrick Palmer.* **265**, L63, 26-C6 (1983)
- HARRIS, D. E. Discovery of a Quasar with a Wide Angle Radio Tail in a Distant Cluster of Galaxies. *D. E. Harris, P. E. Dewdney, C. H. Costain, H. Butcher, and A. G. Willis.* **270**, 39, 77-D4 (1983)
- HARRIS, HUGH C. Radial Velocities of a Random Sample of K Giant Stars and Implications Concerning Multiplicity among Giant Stars in Clusters. *Hugh C. Harris and Robert D. McClure.* **265**, L77, 26-D6 (1983)
- HARRIS, M. J. The *sp*-Process and Allende Isotope Anomalies in Calcium and Titanium. *M. J. Harris.* **264**, 613, 9-A9 (1983)
- HARRIS, WILLIAM E. Color-Magnitude Photometry of 47 Tucanae to  $M_V = +9$ . *William E. Harris, James E. Hesser, and Bruce Atwood.* **268**, L111, 64-A1 (1983)
- Globular Cluster Systems in the Hydra I Elliptical Galaxies. II. *William E. Harris, Malcolm G. Smith, and Eric S. Myra.* **272**, 456, 106-F13 (1983)
- Color-Magnitude Studies of Globular Clusters. I. The Bright Stars in NGC 362: Erratum. *William E. Harris.* **51**, 269, 5-C1 (1983) (Orig. paper in **50**, 573, 31-D1)
- HARTKE, GREGORY J. Pulselike Character of Blackbody Radiation from Neutron Stars. *George Greenstein and Gregory J. Hartke.* **271**, 283, 91-B2 (1983)
- HARTKOPF, WILLIAM I. Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, Belva G. Campbell, and Francis C. Fekel.* **51**, 309, 6-F1 (1983) (Abstr. in **265**, 1135, 25-B11)
- Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, and Belva G. Campbell.* **53**, 241, 19-D4 (1983) (Orig. paper in **51**, 309, 6-F1)
- HARTL, H. A Newly Discovered Nearby Planetary Nebula of Old Age. *R. Weinberger, J. Dengel, H. Hartl, and F. Sabbadin.* **265**, 249, 14-G9 (1983)
- HARTMANN, L. Constraints on the Inclination and Masses of the HDE 226868/Cygnus X-1 System from the Observations. *R. Davis and L. Hartmann.* **270**, 671, 85-D7 (1983)
- Chromospheric and Coronal Emissions from the Giants in the Hyades. *S. L. Baliunas, L. Hartmann, and A. K. Dupree.* **271**, 672, 96-G4 (1983)
- HARTMANN, LEE. Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. *Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers.* **268**, 205, 54-B14 (1983)
- HH 1 and HH 2: The Results of an Eruptive Event in the Cohen-Schwartz Star? *Reinhard Mundt and Lee Hartmann.* **268**, 766, 61-E2 (1983)
- Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. *John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson.* **274**, 125, 125-C5 (1983)
- Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Baliunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning.* **275**, 752, 145-F7 (1983)
- HARTQUIST, T. W. Evidence for the Stochastic Acceleration of Cosmic Rays in Supernova Remnants. *T. W. Hartquist and G. E. Morfill.* **266**, 271, 29-G10 (1983)
- HARTWICK, F. D. A. Studies of Late-Type Dwarfs. V. Theoretical Models for Lower Main-Sequence Stars. *Don A. Vandenberg, F. D. A. Hartwick, P. Dawson, and David R. Alexander.* **266**, 747, 36-D12 (1983)



- The Oxygen Abundance in the Clouds Producing the Ly $\alpha$ -Ly $\beta$  Absorption Systems in the Quasars 4C 5.34 (0805 + 046) and OQ 172 (1442 + 101). *John Norris, F. D. A. Hartwick, and B. A. Peterson.* **273**, 450, 118-D4 (1983)
- HARVEY, J. A.  $^{18}\text{O}(n, n')$  Inelastic Cross Section at 34 keV. *R. L. Macklin, R. R. Winters, N. W. Hill, and J. A. Harvey.* **274**, 408, 128-B11 (1983)
- HARVEY, J. W. Large-Scale Patterns Formed by Solar Active Regions during the Ascending Phase of Cycle 21. *V. Gai-zauskas, K. L. Harvey, J. W. Harvey, and C. Zwaan.* **265**, 1056, 24-C8 (1983)
- HARVEY, K. L. Large-Scale Patterns Formed by Solar Active Regions during the Ascending Phase of Cycle 21. *V. Gai-zauskas, K. L. Harvey, J. W. Harvey, and C. Zwaan.* **265**, 1056, 24-C8 (1983)
- HARVEY, P. M. The Variation of Dust Temperatures in Maffei 2. *L. J. Rickard and P. M. Harvey.* **268**, L7, 57-A8 (1983)
- HARVEY, PAUL M. Infrared Observations of OB Star Formation in NGC 6334. *Paul M. Harvey and Ian Gatley.* **269**, 613, 73-B5 (1983)
- HARWIT, MARTIN. The 157 Micron [C II] Emission from NGC 2024: Core and Halo Components. *Noel L. Kurtz, Scott D. Smyers, Ray W. Russell, Martin Harwit, and Gary Melnick.* **264**, 538, 8-B11 (1983)
- Observations of the 145.5 Micron [O I] Emission Line in the Orion Nebula. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit.* **265**, L7, 18-E5 (1983)
- The Acceleration of Molecular Hydrogen Clouds through Radiative Dissociation. *Martin Harwit and Johannes Schmid-Burgk.* **266**, 602, 34-G6 (1983)
- The Galaxy's 157 Micron [C II] Emission: Observations by Means of a Spectroscopic Lunar Occultation Technique. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit.* **268**, L99, 63-G14 (1983)
- HASCHICK, A. D. The H I Absorption in NGC 5128 (Centaurus A). *J. M. van der Hulst, W. F. Golisch, and A. D. Haschick.* **264**, L37, 11-A9 (1983)
- Water-Vapor Masers Located near Herbig-Haro Objects. *A. D. Haschick, J. M. Moran, L. F. Rodriguez, and P. T. P. Ho.* **265**, 281, 15-B13 (1983)
- HASCHICK, AUBREY D. Formation of OB Clusters: OH Maser Observations. *Paul T. P. Ho, Aubrey D. Haschick, Stuart N. Vogel, and Melvyn C. H. Wright.* **265**, 295, 15-C14 (1983)
- Formation of OB Clusters: W33 Complex. *Aubrey D. Haschick and Paul T. P. Ho.* **267**, 638, 47-F13 (1983)
- Neutral Hydrogen Absorption in the Quasar 3C 268.4: Possible Evidence for Galactic Halo Clouds. *Aubrey D. Haschick, Patrick C. Crane, and Willem A. Baan.* **269**, L43, 76-B3 (1983)
- HAUGAN, MARK P. Gravitational Radiation from Particles Falling along the Symmetry Axis into a Kerr Black Hole: The Momentum Radiated. *Takashi Nakamura and Mark P. Haugan.* **269**, 292, 68-C14 (1983)
- HAUSMAN, MARK A. The Evolution of Voids in the Expanding Universe. *Mark A. Hausman, Donald W. Olson, and Bernard D. Roth.* **270**, 351, 82-A5 (1983)
- HAWKINS, GEORGE. Spectral Energy Distributions of Young Stellar Objects. I. A Turbospheric Model for DR Tauri. *Roger K. Ulrich, Allen W. Shafter, George Hawkins, and Gillian Knapp.* **267**, 199, 42-B2 (1983)
- HAYAKAWA, S. *see also* LAWRENCE, A., *et al.*
- HAYAKAWA, S. Observations of Centaurus X-3 by *Hakucho*. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo.* **264**, 563, 8-D8 (1983)
- Selective Acceleration of  $^3\text{He}$  in Solar Flare Particles by Radiation Pressure. *S. Hayakawa.* **266**, 370, 31-A2 (1983)
- Discovery of X-Ray Bursts from GX 3 + 1 (4U 1744 - 26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo.* **267**, 310, 43-C6 (1983)
- HAYES, D. S. Scanner Observations of Field Horizontal-Branch A Stars. *A. G. Davis Philip and D. S. Hayes.* **53**, 751, 27-A2 (1983) (Abstr. in **274**, 920, 135-E1)
- Multichannel Spectrometer Observations of Globular Cluster Horizontal-Branch A Stars. *D. S. Hayes and A. G. Davis Philip.* **53**, 759, 27-A10 (1983) (Abstr. in **274**, 921, 135-E2)
- HAYMES, R. C. Hard X-Ray Observations of the Crab Nebula and A0535 + 26 with a High Energy Resolution Spectrometer. *J. M. Hameury, D. Boclet, Ph. Durouchoux, T. L. Cline, W. S. Paciesas, B. J. Teegarden, J. Tueller, and R. C. Haymes.* **270**, 144, 78-D14 (1983)
- HAYNES, M. Neutral Hydrogen in X-Ray Cluster Galaxies: A1367. *Guido L. Chincarini, R. Giovanelli, M. Haynes, and P. Fontanelli.* **267**, 511, 46-D9 (1983)
- HAYNES, MARTHA P. 21 Centimeter Observations of Supercluster Galaxies: The Bridge between Coma and A1367. *Guido L. Chincarini, Riccardo Giovanelli, and Martha P. Haynes.* **269**, 13, 65-B4 (1983)
- Neutral Hydrogen in Isolated Galaxies. III. The Redshift Distribution. *Martha P. Haynes and Riccardo Giovanelli.* **275**, 472, 142-F3 (1983)
- HAYNES, R. F. *see also* LAWRENCE, A., *et al.*
- HAYNES, R. F. VLBI Observations of the Nucleus of Centaurus A. *Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **266**, L93, 39-B8 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. *Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **268**, L23, 57-B13 (1983)
- HEARNSHAW, J. B. An Ha Survey of Southern Hemisphere Active Chromosphere Stars. *Bernard W. Bopp and J. B. Hearns-haw.* **267**, 653, 48-A1 (1983)
- HEASLEY, J. N. Structure and Spectrum of Quiescent Prominences. IV. The Ultraviolet Ionization Continua of Hydrogen and Helium. *J. N. Heasley and R. W. Milkey.* **268**, 398, 56-C1 (1983)
- H $\alpha$  Line Profiles in B Stars: Comparison of Theory and Observations. *J. N. Heasley and Sidney C. Wolff.* **269**, 634, 73-C14 (1983)
- HECKMAN, T. M. Spectroscopy of the Fuzz Associated with Four Quasars. *Bruce Balick and T. M. Heckman.* **265**, L1, 18-D14 (1983)
- An Infrared and Optical Investigation of Galactic Nuclei with Compact Radio Sources. *T. M. Heckman, M. J. Lebofsky, G. H. Rieke, and W. van Breugel.* **272**, 400, 106-B8 (1983)
- HECKMAN, TIMOTHY. Radio and Optical Observations of the Alleged Optical Jet in DA 240. *Wil van Breugel, Timothy Heckman, Alan Bridle, Harvey Butcher, Richard Strom, and Bruce Balick.* **275**, 61, 137-E11 (1983)
- HECKMAN, TIMOTHY M. Spatially Extended Narrow Emission-Line Gas in the Seyfert Galaxy NGC 4151. *Timothy M. Heckman and Bruce Balick.* **268**, 102, 53-A9 (1983)
- Enhanced Radio Emission in Merging Galaxies. *Timothy M. Heckman.* **268**, 628, 59-G11 (1983)
- The Emission-Line Gas in Quasars and Active Nuclei: Implications for the Nature of Core-Dominant Radio Sources. *Timothy M. Heckman.* **271**, L5, 93-A6 (1983)
- Radio Emission and the Masses of Elliptical Galaxies. *Timothy M. Heckman.* **273**, 505, 119-B3 (1983)
- HEESCHEN, D. S. Millimeter-Wavelength Outbursts in the Elliptical Galaxy NGC 1052. *D. S. Heeschen and J. J. Pus-*

- chell. **267**, L11, 45-C1 (1983)  
 A Variable Radio Source in the Clumpy Irregular Galaxy Markarian 297. *D. S. Heeschen, J. Heidmann, and Q. F. Yin.* **267**, L73, 51-A7 (1983)
- HEIDMANN, J. A Variable Radio Source in the Clumpy Irregular Galaxy Markarian 297. *D. S. Heeschen, J. Heidmann, and Q. F. Yin.* **267**, L73, 51-A7 (1983)
- HEILES, CARL. Distance to the 1.5 Millisecond Pulsar and Other 4C 21.53 Objects. *Carl Heiles, Shrinivas R. Kulkarni, Mary A. Stevens, D. C. Backer, M. M. Davis, and W. M. Goss.* **273**, L75, 123-B11 (1983)
- HEILES, CARL E. A Survey of H I Absorption at Low Latitudes. *John M. Dickey, Shrinivas R. Kulkarni, J. H. van Gorkom, and Carl E. Heiles.* **53**, 591, 24-G11 (1983) (Abstr. in **273**, 840, 122-F10)
- HEINTZ, W. D. Micrometer Observations of Double Stars and New Pairs. *XI. W. D. Heintz.* **51**, 249, 5-A1 (1983) (Abstr. in **264**, 748, 10-D12)
- HELFAND, D. J. G29.7-0.3: Another Supernova Remnant with an Identity Crisis. *R. H. Becker, D. J. Helfand, and A. E. Szymkowiak.* **268**, L93, 63-F9 (1983)
- HELFAND, DAVID J. X-Rays from Radio Pulsars: The Detection of PSR 1055-52. *Andrew F. Cheng and David J. Helfand.* **271**, 271, 91-A4 (1983)  
 Supernova Remnants in the Magellanic Clouds. *D. S. Mathewson, V. L. Ford, M. A. Dopita, I. R. Tuohy, K. S. Long, and David J. Helfand.* **51**, 345, 7-F1 (1983) (Abstr. in **266**, 902, 38-B11)
- HELLINGS, R. W. Upper Limits on the Isotropic Gravitational Radiation Background from Pulsar Timing Analysis. *R. W. Hellings and G. S. Downs.* **265**, L39, 26-A7 (1983)
- HELMINGER, PAUL. Laboratory Millimeter and Submillimeter Spectrum of HOC<sup>+</sup>. *Geoffrey A. Blake, Paul Helminger, Eric Herbst, and Frank C. De Lucia.* **264**, L69, 11-C12 (1983)
- HELOU, GEORGE. Effects of Environment on Neutral Hydrogen Distribution for Disk Galaxies in the Virgo Cluster Area. *C. Giovanardi, George Helou, E. E. Salpeter, and Nathan Krumm.* **267**, 35, 40-C13 (1983)  
 Discovery of a Large Intergalactic H I Cloud in the M96 Group. *Stephen E. Schneider, George Helou, Edwin E. Salpeter, and Yervant Terzian.* **273**, L1, 117-B2 (1983)
- HENDRY, ELAINE M. Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, Belya G. Campbell, and Francis C. Fekel.* **51**, 309, 6-F1 (1983) (Abstr. in **265**, 1135, 25-B11)  
 Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, and Belya G. Campbell.* **53**, 241, 19-D4 (1983) (Orig. paper in **51**, 309, 6-F1)
- HENKEL, C. A Search for  $\pi$ ,  $N=1$ ,  $J=3/2$  Lambda-Doubling Transitions of CH. *L. M. Ziurys, C. Henkel, and R. J. Sankally.* **275**, 175, 139-A4 (1983)
- HENKEL, CHRISTIAN. SiS Maser Emission from IRC +10°216. *Christian Henkel, Henry E. Matthews, and Mark Morris.* **267**, 184, 42-A1 (1983)
- HENOUX, J. C. Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. *J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado.* **265**, 1066, 24-D5 (1983)
- HENRICH, H. F. Episodic Mass Loss and Narrow Lines in Gamma Cassiopeiae and in Other Early-Type Stars. *H. F. Henrichs, G. Hammerschlag-Hensberge, I. D. Howarth, and P. Barr.* **268**, 807, 62-A1 (1983)
- HENRIKSEN, R. N. Pressure Collimation of Supersonic Radio Jets. *Arno Krautter, R. N. Henriksen, and Kayll Lake.* **269**, 81, 65-G6 (1983)
- HENRY, GREGORY W. Discovery of Eclipses in the X-Ray Source HD 155638. *Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry.* **270**, L79, 87-D8 (1983)
- HENRY, J. PATRICK. Extended Soft X-Ray Emission from NGC 4151. *Martin Elvis, Ulrich G. Briel, and J. Patrick Henry.* **268**, 105, 53-A13 (1983)  
 The X-Ray Luminosity Function of Very Rich Clusters and the Luminosity-Richness Relation. *Andrzej Soltan and J. Patrick Henry.* **271**, 442, 94-C2 (1983)  
 X-Ray, Optical, and Radio Observations of the Blue Galaxy Butcher-Oemler 6 in the 3C 295 Cluster. *J. Patrick Henry, John T. Clarke, Stuart Bowyer, and Russell J. Lavery.* **272**, 434, 106-D14 (1983)
- HENRY, R. B. C. Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea.* **274**, 101, 125-A9 (1983)
- HENRY, RICHARD B. C. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puscheil, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski.* **274**, 62, 124-E11 (1983)
- HENRY, RONALD J. W. Oscillator Strengths and Collision Strengths for O II and O III. *Y. K. Ho and Ronald J. W. Henry.* **264**, 733, 10-C11 (1983)  
 Oscillator Strengths and Collision Strengths for S II. *Y. K. Ho and Ronald J. W. Henry.* **267**, 886, 50-D8 (1983)
- HENSON, G. D. Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. *J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radostitz, W. C. Priedhorsky, J. Terrell, and E. N. Walker.* **271**, L65, 100-B8 (1983)
- HENSON, GARY D. The Broad-Band Circular Polarization of Sunspots, 0.37-4.5 Microns. *James C. Kemp and Gary D. Henson.* **266**, L69, 32-E7 (1983)  
 Discovery of Eclipse Polarization in Algol. *James C. Kemp, Gary D. Henson, Mark S. Barbour, Daniel J. Kraus, and George W. Collins II.* **273**, L85, 123-C7 (1983)
- SS 433: Improved Evidence for a Persistent 160 Day Photometric Period. *Gary D. Henson, James C. Kemp, Mark S. Barbour, Daniel J. Kraus, Elia M. Leibowitz, and Tsevi Mazeh.* **275**, 247, 139-F10 (1983)
- HENZE, W. Fluid Motions in the Solar Chromosphere-Corona Transition Region. I. Line Widths and Doppler Shifts for C IV. *R. G. Athay, J. B. Gurman, W. Henze, and R. A. Shine.* **265**, 519, 17-F3 (1983)  
 Fluid Motions in the Solar Chromosphere-Corona Transition Region. III. Active Region Flows from Wide Slit Dopplergrams. *R. G. Athay, J. B. Gurman, and W. Henze.* **269**, 706, 74-B9 (1983)
- HERBIG, GEORGE H. Observations of Suspected Low-Mass Post-T Tauri Stars and Their Evolutionary Status. *Reinhard Mundt, Frederick M. Walter, Eric D. Feigelson, Ulrich Finkenzeller, George H. Herbig, and Andrew P. Odell.* **269**, 229, 67-F3 (1983)
- HERBST, ERIC. Laboratory Millimeter and Submillimeter Spectrum of HOC<sup>+</sup>. *Geoffrey A. Blake, Paul Helminger, Eric Herbst, and Frank C. De Lucia.* **264**, L69, 11-C12 (1983)  
 Laboratory Measurements of Ion-Molecule Reactions Pertaining to Interstellar Hydrocarbon Synthesis. *Eric Herbst, Nigel G. Adams, and David Smith.* **269**, 329, 68-F12 (1983)  
 Laboratory Measurement of the  $J = 2 \rightarrow 3$  Rotational Tran-

- sition Frequency of  $\text{HC}^{17}\text{O}^+$ . *Grant M. Plummer, Eric Herbst, and Frank C. De Lucia*. **270**, L99, 87-F7 (1983)
- Association Reactions of  $\text{Na}^+$  and Some Implications for Interstellar Chemistry. *David Smith, Nigel G. Adams, Erich Alge, and Eric Herbst*. **272**, 365, 105-A6 (1983)
- Ion-Molecule Syntheses of Interstellar Molecular Hydrocarbons through  $\text{C}_2\text{H}$ : Toward Molecular Complexity. *Eric Herbst*. **53**, 41, 17-D3 (1983) (Abstr. in **271**, 890, 99-B12)
- HERMSEN, W. Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gottwald, W. Hermesen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills*. **274**, 231, 126-C13 (1983)
- HERNANZ, M. Collapse and Explosion of White Dwarfs. I. Pre-collapse Evolution. *J. Isern, J. Labay, M. Hernanz, and R. Canal*. **273**, 320, 115-F8 (1983)
- HERTER, T. Detection of Sulfur in the Galactic Center. *T. Herter, D. A. Briotta, Jr., G. E. Gull, M. A. Shure, and J. R. Houck*. **267**, L37, 45-D13 (1983)
- Determinations of S III, O IV, and Ne V Abundances in Planetary Nebulae from Infrared Lines. *M. A. Shure, T. Herter, J. R. Houck, D. A. Briotta, Jr., W. J. Forrest, G. E. Gull, and J. F. McCarthy*. **270**, 645, 85-B9 (1983)
- O IV Temperature Determination for NGC 7662. *M. A. Shure, T. Herter, and J. R. Houck*. **274**, 646, 132-D11 (1983)
- HERTZ, PAUL. X-Ray Evidence for White Dwarf Binaries in Globular Clusters. *Paul Hertz and Jonathan E. Grindlay*. **267**, L83, 51-B2 (1983)
- An X-Ray Survey of Globular Clusters and Their X-Ray Luminosity Function. *Paul Hertz and Jonathan E. Grindlay*. **275**, 105, 138-B13 (1983)
- HESSER, JAMES E. Color-Magnitude Photometry of 47 Tucanae to  $M_V = +9$ . *William E. Harris, James E. Hesser, and Bruce Atwood*. **268**, L111, 64-A1 (1983)
- Spectroscopic Analysis of Dwarf and Subgiant Stars in 47 Tucanae. *R. A. Bell, James E. Hesser, and R. D. Cannon*. **269**, 580, 72-F13 (1983)
- HESTER, J. JEFF. Digital Analysis of Narrow-Band Imagery of the Cygnus Loop. *J. Jeff Hester, Robert A. R. Parker, and Reginald J. Dufour*. **273**, 219, 114-E10 (1983)
- HEYMANN, D. Barium from a Mini  $r$ -Process in Supernovae. *D. Heymann*. **267**, 747, 49-A1 (1983)
- HIBBERT, A. Si III Line Ratios in the Sun. *P. L. Dufton, A. Hibbert, A. E. Kingston, and G. A. Doschek*. **274**, 420, 128-C9 (1983)
- HICKEY, JEFFREY P. Four-Color Photometry of RZ Ophiuchi and Its Accretion Disk. *Edward C. Olson and Jeffrey P. Hickey*. **264**, 251, 3-E9 (1983)
- HILDEBRAND, R. H. Submillimeter Observations of W3. *D. T. Jaffe, R. H. Hildebrand, Jocelyn Keene, and S. E. Whitcomb*. **273**, L89, 123-C11 (1983)
- Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. *Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic*. **274**, L43, 129-D3 (1983)
- HILDNER, E. A Coronal Transient Associated with a High-Speed Type II Burst. *T. E. Gergely, M. R. Kundu, and E. Hildner*. **268**, 403, 56-C6 (1983)
- HILL, J. Interstellar Abundances of Oxygen and Nitrogen. *D. G. York, L. Spitzer, R. C. Bohlin, J. Hill, E. B. Jenkins, B. D. Savage, and T. P. Snow*. **266**, L55, 32-D8 (1983)
- HILL, J. K. Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart*. **267**, L89, 51-B7 (1983)
- Images in the Rocket Ultraviolet: The Starburst in the Nucleus of M83. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, and T. P. Stecher*. **274**, L53, 136-A8 (1983)
- HILL, JESSE K. A Survey of Ultraviolet Interstellar Absorption Lines. *Ralph C. Bohlin, Jesse K. Hill, Edward B. Jenkins, Blair D. Savage, Theodore P. Snow, Jr., Lyman Spitzer, Jr., and Donald G. York*. **51**, 277, 6-B1 (1983) (Abstr. in **265**, 1135, 25-B11)
- HILL, N. W.  $^{187}\text{Os}(n, n')$  Inelastic Cross Section at 34 keV. *R. L. Macklin, R. R. Winters, N. W. Hill, and J. A. Harvey*. **274**, 408, 128-B11 (1983)
- HILL, R. E. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- HILL, T. W. The Magnetosphere of Uranus: Plasma Sources, Convection, and Field Configuration. *G.-H. Voigt, T. W. Hill, and A. J. Dessler*. **266**, 390, 31-B8 (1983)
- HILLIER, D. J. Infrared Spectra of WN Stars. I. HD 50896. *D. J. Hillier, T. J. Jones, and A. R. Hyland*. **271**, 221, 90-D9 (1983)
- HILLS, J. G. The Effect of Sudden Mass Loss and a Random Kick Velocity Produced in a Supernova Explosion on the Dynamics of a Binary Star of Arbitrary Orbital Eccentricity. Applications to X-Ray Binaries and to the Binary Pulsars. *J. G. Hills*. **267**, 322, 43-D4 (1983)
- HILTNER, W. A. UVB Photometry for Southern OB Stars. *R. E. Schild, R. F. Garrison, and W. A. Hiltner*. **51**, 321, 7-A2 (1983) (Abstr. in **266**, 903, 38-B12)
- Massive Eclipsing Binary Candidates. *R. F. Garrison, R. E. Schild, and W. A. Hiltner*. **52**, 1, 9-A2 (1983) (Abstr. in **267**, 892, 50-D14)
- HINATA, SATOSHI. A Dynamical Model of Coronal Loops. *Satoshi Hinata*. **272**, 715, 109-E9 (1983)
- HISCOCK, WILLIAM A. On Axisymmetric Perturbations of Some Rotating Stars. *William A. Hiscock*. **266**, 248, 29-E13 (1983)
- On the Stability of Rotating Stellar Models in General Relativity Theory. *Lee Lindblom and William A. Hiscock*. **267**, 384, 44-A10 (1983)
- HJALMARSON, Å. The  $[\text{HCO}^+]/[\text{HOC}^+]$  Abundance Ratio in Molecular Clouds. *R. C. Woods, C. S. Gudeman, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarson, L.-Å. Nyman, and H. Olofsson*. **270**, 583, 84-D14 (1983)
- HJALMARSON, ÅKE. Observations of Sulfur Dioxide in the Kleinmann-Low Nebula. *F. Peter Schloerb, Per Friberg, Åke Hjalmarson, Bertil Höglund, and William M. Irvine*. **264**, 161, 2-F1 (1983)
- HJELLMING, R. M. The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35$  c. *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming*. **273**, L65, 123-B3 (1983)
- Radio Emission from Antares and an Ionized Cavity in Its Wind. *R. M. Hjellming and R. T. Newell*. **275**, 704, 154-C1 (1983)
- Limits to the Rate of Component Separation in Scorpius X-1. *E. B. Fomalont, B. J. Geldzahler, R. M. Hjellming, and C. M. Wade*. **275**, 802, 146-C11 (1983)
- Ho, P. T. P. Water-Vapor Masers Located near Herbig-Haro Objects. *A. D. Haschick, J. M. Moran, L. F. Rodriguez, and P. T. P. Ho*. **265**, 281, 15-B13 (1983)
- Source of the High-Velocity Molecular Flow in Orion. *M. C. H. Wright, R. L. Plambeck, S. N. Vogel, P. T. P. Ho, and W. J. Welch*. **267**, L41, 45-E3 (1983)

- VLA Observations of Massive Star Formation in Spiral Nuclei. *J. L. Turner and P. T. P. Ho.* **268**, L79, 63-E10 (1983)
- HO, PAUL T. P. Formation of OB Clusters: OH Maser Observations. *Paul T. P. Ho, Aubrey D. Haschick, Stuart N. Vogel, and Melvyn C. H. Wright.* **265**, 295, 15-C14 (1983)
- VLA Observations of Warm NH<sub>3</sub> Associated with Mass Outflows in W51. *Paul T. P. Ho, Reinhard Genzel, and Anirudha Das.* **266**, 596, 34-F14 (1983)
- Formation of OB Clusters: W33 Complex. *Aubrey D. Haschick and Paul T. P. Ho.* **267**, 638, 47-F13 (1983)
- VLA Observations of Extragalactic NH<sub>3</sub> in IC 342. *Paul T. P. Ho and Robert N. Martin.* **272**, 484, 107-B3 (1983)
- Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? *José M. Torrelles, Luis F. Rodríguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho.* **274**, 214, 126-B10 (1983)
- HO, Y. K. Oscillator Strengths and Collision Strengths for O II and O III. *Y. K. Ho and Ronald J. W. Henry.* **264**, 733, 10-C11 (1983)
- Oscillator Strengths and Collision Strengths for S II. *Y. K. Ho and Ronald J. W. Henry.* **267**, 886, 50-D8 (1983)
- HOBBS, L. M. Theoretical Oscillator Strengths for 21 Spin-forbidden Lines of C, N, O, Al, and Si: Erratum. *Robert D. Cowan, L. M. Hobbs, and D. G. York.* **265**, 582, 18-C13 (1983) (Orig. paper in **257**, 373, 65-A7)
- Electron and Local Gas Densities in Diffuse Interstellar Clouds from Measurements of Ca I Absorption. *S. R. Federman and L. M. Hobbs.* **265**, 813, 21-E13 (1983)
- Interstellar Absorption toward HD 14633. *L. M. Hobbs.* **265**, 817, 21-F3 (1983)
- Interstellar C<sub>2</sub> Molecules in a Taurus Dark Cloud. *L. M. Hobbs, John H. Black, and Ewine F. van Dishoeck.* **271**, L95, 100-D7 (1983)
- HOBBS, R. W. On the Microwave Emission from Comets: Erratum. *D. M. Gibson and R. W. Hobbs.* **269**, 805, 75-C4 (1983) (Orig. paper in **248**, 863, 91-A1)
- HODGE, P. E. *see also* LAWRENCE, A., *et al.*
- HODGE, P. E. Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea.* **274**, 101, 125-A9 (1983)
- HODGE, P. W. Age Calibrations of Magellanic Cloud Clusters. *P. W. Hodge.* **264**, 470, 7-D10 (1983)
- The Radial Distribution of H II Regions in Spiral Galaxies. *P. W. Hodge and R. C. Kennicutt, Jr.* **267**, 563, 47-A5 (1983)
- HODGE, PAUL. The Spatial Distribution of H II Regions in NGC 4321. *Scott Anderson, Paul Hodge, and Robert C. Kennicutt, Jr.* **265**, 132, 13-E2 (1983)
- The Age and Composition of the LMC Red Globular Cluster NGC 2121. *Phillip Flower, Douglas Geisler, Paul Hodge, Edward Olszewski, and Robert Schommer.* **275**, 15, 137-B7 (1983)
- HODGE, PAUL W. Carbon Stars and the Seven Dwarfs. *Marc Aaronson, Edward W. Olszewski, and Paul W. Hodge.* **267**, 271, 42-G5 (1983)
- HODGE, PHILLIP E. Dramatic Variations in the Polarization of BL Lacertae: Shocks and Gas? *Hugh D. Aller, Phillip E. Hodge, and Margo F. Aller.* **274**, L19, 129-B3 (1983)
- HODSON, STEPHEN W. Double-Mode RR Lyrae Variables in M15. *Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy.* **266**, 94, 28-A4 (1983)
- The Discovery of Nonradial Instability Strips for Hot, Evolved Stars. *Sumner G. Starrfield, Arthur N. Cox, Stephen W. Hodson, and W. D. Pesnell.* **268**, L27, 57-C3 (1983)
- Theoretical Radial Pulsation Analyses of DA White Dwarfs. *Sumner Starrfield, Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy.* **269**, 645, 73-D14 (1983)
- HOESSEL, J. G. Photometry of Resolved Galaxies. III. GR 8. *J. G. Hoessel and G. E. Danielson.* **271**, 65, 88-E14 (1983)
- Photometry of Resolved Galaxies. II. Sextans A. *J. G. Hoessel, R. A. Schommer, and G. E. Danielson.* **274**, 577, 131-E8 (1983)
- HOESSEL, JOHN G. CCD Photometry of Abell Clusters. I. Magnitudes and Redshifts for 84 Brightest Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel.* **264**, 337, 6-A5 (1983)
- CCD Photometry of Abell Clusters. II. Surface Photometry of 249 Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel.* **268**, 476, 58-C2 (1983)
- HOFFMAN, G. L. Spherical Simulations of Holes and Honeycombs in Friedmann Universes. *G. L. Hoffman, E. E. Salpeter, and I. Wasserman.* **268**, 527, 58-F13 (1983)
- The Collapse and Violent Relaxation of N-Body Systems: Mass Segregation and the Secondary Maximum. *R. T. Farouki, G. L. Hoffman, and E. E. Salpeter.* **271**, 11, 88-B2 (1983)
- HOFFMANN, DIETER H. H. Cross Section for the Reaction <sup>12</sup>C(e,p)<sup>11</sup>B and Its Relevance to the Formation of <sup>11</sup>B in Active Galaxies. *Dieter H. H. Hoffmann, Achim Richter, Gerhard Schrieder, and Klaus Seegebarth.* **271**, 398, 92-C8 (1983)
- HOGAN, C. J. Cosmological Density Fluctuations and Radiation Anisotropy Generated by Pregalactic Sources of Radiation. *C. J. Hogan and N. Kaiser.* **274**, 7, 124-A12 (1983)
- HÖGLUND, BERTIL. Observations of Sulfur Dioxide in the Kleinmann-Low Nebula. *F. Peter Schloerb, Per Friberg, Åke Hjalmarson, Bertil Höglund, and William M. Irvine.* **264**, 161, 2-F1 (1983)
- HOLLENBACH, D. J. The Gas-Grain Interaction in the Interstellar Medium: Thermal Accommodation and Trapping. *John R. Burke and D. J. Hollenbach.* **265**, 223, 14-E7 (1983)
- HOLLENBACH, DAVID J. Modeling of G333.6-0.2 as a Spherical H II Region. *Robert H. Rubin, David J. Hollenbach, and Edwin F. Erickson.* **265**, 239, 14-F13 (1983)
- H<sub>2</sub>O Heating in Molecular Clouds: Line Transfer and Thermal Balance in a Warm Dusty Medium. *Takamasa Takahashi, David J. Hollenbach, and Joseph Silk.* **275**, 145, 138-E14 (1983)
- HOLLIS, J. M. Methanol in Orion A: Simultaneous Observations of Corresponding Rotational Transitions in the Ground and Torsionally Excited States. *J. M. Hollis, F. J. Lovas, R. D. Suenram, P. R. Jewell, and L. E. Snyder.* **264**, 543, 8-C2 (1983)
- High Spatial Resolution VLA Observations of the R Aquarii Jet. *M. Kafatos, J. M. Hollis, and A. G. Michalitsianos.* **267**, L103, 51-C7 (1983)
- An Extensive Galactic Search for Conformer II Glycine. *L. E. Snyder, J. M. Hollis, R. D. Suenram, F. J. Lovas, L. W. Brown, and D. Buhl.* **268**, 123, 53-C3 (1983)
- Comparisons of C<sup>+</sup> Distributions with New Interstellar Sources of HCO Emission. *J. M. Hollis and E. Churchwell.* **271**, 170, 89-G4 (1983)
- The Kinetic Temperature and CH<sub>3</sub>CCH Column Density Profiles in Sgr B2, Orion, and DR 21. *E. Churchwell and J. M. Hollis.* **272**, 591, 108-C6 (1983)
- HOLLWEG, JOSEPH V. Collisional Damping of Surface Waves in the Solar Corona. *Bruce E. Gordon and Joseph V. Hollweg.* **266**, 373, 31-A5 (1983)
- HOLM, ALBERT V. HD 207739: A Strange Composite Star. *Sidney B. Parsons, Albert V. Holm, and Yoji Kondo.* **264**, L19, 5-B4 (1983)
- HOLMAN, GORDON D. Solar Type II Radio Emission and the Shock Drift Acceleration of Electrons. *Gordon D. Holman and M. E. Pesses.* **267**, 837, 50-A1 (1983)
- HOLT, S. S. Rapid X-Ray Variability from the Seyfert 1 Galaxy NGC 4051. *F. E. Marshall, S. S. Holt, R. F. Mushotzky, and*



- R. H. Becker. **269**, L31, 76-A7 (1983)  
Evidence for an ~300 Day Period in Cygnus X-1. W. C. Friedhorsky, J. Terrell, and S. S. Holt. **270**, 233, 79-D10 (1983)  
Accretion Powered X-Ray Pulsars. N. E. White, J. H. Swank, and S. S. Holt. **270**, 711, 85-G7 (1983)
- HOLZER, T. E. The Solar Wind Ionization State as a Coronal Temperature Diagnostic. S. P. Owocki, T. E. Holzer, and A. J. Hundhausen. **275**, 354, 140-G6 (1983)
- HOLZER, THOMAS E. Alfvén Waves in Stellar Winds. Thomas E. Holzer, Tor Flå, and Egil Leer. **275**, 808, 146-D3 (1983)
- HONEYCUTT, R. KENT. Time-resolved Spectrophotometry of the Nova-like Variable RW Trianguli. Ronald H. Kaitchuck, R. Kent Honeycutt, and Eric M. Schlegel. **267**, 239, 42-E1 (1983)  
Time-resolved Spectrophotometry of the Nova-like Variable US Ursae Majoris. Eric M. Schlegel, R. Kent Honeycutt, and Ronald H. Kaitchuck. **53**, 397, 22-A5 (1983) (Abstr. in **272**, 786, 110-C11)
- HORAK, TOMAS. The Development of Structure in Shearing, Viscous Media. II. James H. Hunter, Jr. and Tomas Horak. **265**, 402, 16-D12 (1983)
- HORANYI, M. Charge Exchange in Solar Wind-Cometary Interactions. T. I. Gombosi, M. Horanyi, K. Kecskemety, T. E. Cravens, and A. F. Nagy. **268**, 889, 62-G1 (1983)  
Charge Exchange in Solar Wind-Cometary Interactions: Erratum. T. I. Gombosi, M. Horanyi, K. Kecskemety, T. E. Cravens, and A. F. Nagy. **274**, 919, 135-D14 (1983) (Orig. paper in **268**, 889, 63-A1)
- HOREDT, G. P. Level Surface Approach for Uniformly Rotating, Axisymmetric Polytropes. G. P. Horedt. **269**, 303, 68-D11 (1983)
- HORNE, KEITH. The Correlated X-Ray and Optical Time Variability of TT Arietis. K. A. Jensen, France A. Córdova, J. Middleditch, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer. **270**, 211, 79-B14 (1983)
- HOUCK, J. R. Detection of Sulfur in the Galactic Center. T. Herter, D. A. Briotta, Jr., G. E. Gull, M. A. Shure, and J. R. Houck. **267**, L37, 45-D13 (1983)  
Determinations of S III, O IV, and Ne V Abundances in Planetary Nebulae from Infrared Lines. M. A. Shure, T. Herter, J. R. Houck, D. A. Briotta, Jr., W. J. Forrest, G. E. Gull, and J. F. McCarthy. **270**, 645, 85-B9 (1983)  
O IV Temperature Determination for NGC 7662. M. A. Shure, T. Herter, and J. R. Houck. **274**, 646, 132-D11 (1983)
- HOUGH, D. H. Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney. **265**, 107, 13-C2 (1983)
- HOUSE, L. The Association of Radio Noise Storm Enhancements with the Appearance of Additional Material in the Corona. A. Kerdraon, M. Pick, G. Trotter, C. Sawyer, R. Illing, W. Wagner, and L. House. **265**, L19, 18-F1 (1983)
- HOVESTADT, D. Temporal Variations of Nucleonic Abundances in Solar Flare Energetic Particle Events. I. Well-connected Events. G. M. Mason, G. Gloeckler, and D. Hovestadt. **267**, 844, 50-A8 (1983)
- HOWARD, A. J. Nucleosynthesis of  $^{26}\text{Al}$  at Low Stellar Temperatures. A. E. Champagne, A. J. Howard, and P. D. Parker. **269**, 686, 74-A1 (1983)
- HOWARD, R. The QSO 1156+295: A Multifrequency Study of Recent Activity. Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- HOWARD, R. A. Direct Evidence of Type III Electron Streams Propagating in Coronal Streamers. M. R. Kundu, T. E. Gergely, P. J. Turner, and R. A. Howard. **269**, L67, 76-C11 (1983)  
Associations between Coronal Mass Ejections and Soft X-Ray Events. N. R. Sheeley, Jr., R. A. Howard, M. J. Koomen, and D. J. Michels. **272**, 349, 104-G1 (1983)
- HOWARTH, I. D. Episodic Mass Loss and Narrow Lines in Gamma Cassiopeiae and in Other Early-Type Stars. H. F. Henrichs, G. Hammerschlag-Hensberge, I. D. Howarth, and P. Barr. **268**, 807, 62-A1 (1983)
- HOWE, S. High-Energy X-Ray Observations of Vela X-1. M. Bautz, S. Howe, A. Gorecki, F. Lang, A. Levine, F. Primini, and W. H. G. Lewin. **266**, 794, 37-A8 (1983)
- HOWE, S. K. HEAO 1 High-Energy X-Ray Observations of Centaurus X-3. S. K. Howe, F. A. Primini, M. W. Bautz, F. L. Lang, A. M. Levine, and W. H. G. Lewin. **272**, 678, 109-B12 (1983)
- HOYNG, P. Microwave and Hard X-Ray Imaging of a Solar Flare on 1980 November 5. P. Hoyng, K. A. Marsh, H. Zirin, and B. R. Dennis. **268**, 865, 62-E5 (1983)
- HOYT, DOUGLAS V. Sunspot Areas and Solar Irradiance Variations during 1980. Douglas V. Hoyt, John A. Eddy, and Hugh S. Hudson. **275**, 878, 147-B7 (1983)
- HU, E. M. Two-dimensional Spectrophotometry of the Cores of X-Ray Luminous Clusters. L. L. Cowie, E. M. Hu, E. B. Jenkins, and D. G. York. **272**, 29, 101-C6 (1983)  
The Filaments of NGC 1275: A Collision between a Galaxy and an Accretion Flow? E. M. Hu, L. L. Cowie, P. Kaaret, E. B. Jenkins, D. G. York, and F. L. Roesler. **275**, L27, 148-A4 (1983)
- HU, Y. Q. Induced Mass and Wave Motions in the Lower Solar Atmosphere. I. Effects of Shear Motion of Flux Tubes. S. T. Wu, Y. Q. Hu, Y. Nakagawa, and E. Tandberg-Hanssen. **266**, 866, 37-G1 (1983)
- HUANG, KE-LIANG. Low Frequency Asymptotic Spectra of Multiple, Decelerating Adiabatic Bursts. Peter D. Usher, Ke-Liang Huang, Kenneth J. Mitchell, and Joseph T. Pollock. **264**, 451, 7-C2 (1983)
- HUANG, Y.-L. A Large Molecular Cloud toward the SNR W50 and SS 433. Y.-L. Huang, T. M. Dame, and P. Thaddeus. **272**, 609, 108-D10 (1983)
- HUBBARD, E. N. Theoretical Quasar Emission-Line Profiles. I. Curve-of-Growth Effects on Observed Profiles. E. N. Hubbard and R. C. Puetter. **265**, 35, 12-D10 (1983)  
Theoretical Quasar Emission-Line Profiles. II. Effects of Source Function Variation and Total Thickness. R. C. Puetter and E. N. Hubbard. **273**, 36, 112-E2 (1983)
- HUBBARD, W. B. Statistical Mechanics of Light Elements at High Pressure. V. Three-dimensional Thomas-Fermi-Dirac Theory. J. J. MacFarlane and W. B. Hubbard. **272**, 301, 104-C3 (1983)
- HUCHRA, J. P. Optical and X-Ray Observations of Faint Quasars in an Optically Selected Sample. H. L. Marshall, H. Tananbaum, G. Zamorani, J. P. Huchra, A. Braccetti, and V. Zitelli. **269**, 42, 65-D9 (1983)  
Groups of Galaxies. III. The CfA Survey. M. J. Geller and J. P. Huchra. **52**, 61, 10-A2 (1983) (Abstr. in **268**, 906, 63-A9)
- HUCHRA, JOHN. A Survey of Galaxy Redshifts. IV. The Data. John Huchra, Marc Davis, David Latham, and John Tonry. **52**, 39, 10-D11 (1983) (Abstr. in **268**, 906, 63-A9)
- HUCHRA, JOHN P. Galaxy Clusters with Multiple Components. II. Abell 115. Timothy C. Beers, John P. Huchra, and Margaret J. Geller. **264**, 356, 6-B12 (1983)  
The Cancer Cluster: An Unbound Collection of Groups. Gregory D. Bothun, Margaret J. Geller, Timothy C. Beers, and John P. Huchra. **268**, 47, 52-D10 (1983)  
Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter,

- Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson. **274**, 125, 125-C5 (1983)
- HUDSON, H. S. First-Order Fermi Acceleration in Solar Flares as a Mechanism for the Second-Step Acceleration of Prompt Protons and Relativistic Electrons. *T. Bai, H. S. Hudson, R. M. Pelling, R. P. Lin, R. A. Schwartz, and T. T. von Rosenvinge.* **267**, 433, 44-E3 (1983)
- HUDSON, HUGH S. Sunspot Areas and Solar Irradiance Variations during 1980. *Douglas V. Hoyt, John A. Eddy, and Hugh S. Hudson.* **275**, 878, 147-B7 (1983)
- HUGGINS, P. J. The Structure of Bright-rimmed Molecular Clouds. *Alwyn Wootten, Anneila Sargent, Gillian Knapp, and P. J. Huggins.* **269**, 147, 66-F4 (1983)
- Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wootten, C. Masson, and M. A. Frerking.* **273**, 633, 120-D13 (1983)
- Multifrequency Observations of the Flaring Quasar 1156 + 295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea.* **274**, 101, 125-A9 (1983)
- HUGUENIN, G. R. The  $[\text{HCO}^+]/[\text{HOC}^+]$  Abundance Ratio in Molecular Clouds. *R. C. Woods, C. S. Gudeaman, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarson, L.-Å. Nyman, and H. Olofsson.* **270**, 583, 84-D14 (1983)
- HUMMEL, E. Anomalous Radio Continuum Features in Edge-on Spiral Galaxies. *E. Hummel, J. H. van Gorkom, and C. G. Kotanyi.* **267**, L5, 45-B6 (1983)
- HUMMER, D. G. Second-Order Escape Probability Approximations in Radiative Transfer: Erratum. *D. G. Hummer and George B. Rybicki.* **271**, 888, 99-B10 (1983) (Orig. paper in **263**, 925, 141-G7)
- The Specific Luminosity of a Three-dimensional Medium in Terms of the Escape Probability. *George B. Rybicki and D. G. Hummer.* **274**, 380, 127-G11 (1983)
- HUMPHREYS, R. M. M Supergiants and the Distance to M101. *R. M. Humphreys and S. E. Strom.* **264**, 458, 7-C9 (1983)
- HUMPHREYS, ROBERTA M. Studies of Luminous Stars in Nearby Galaxies. VIII. The Small Magellanic Cloud. *Roberta M. Humphreys.* **265**, 176, 14-A5 (1983)
- The Brightest Stars as Extragalactic Distance Indicators. *Roberta M. Humphreys.* **269**, 335, 70-A5 (1983)
- HUNDHAUSEN, A. J. The Effect of a Coronal Shock Wave on the Solar Wind Ionization State. *S. P. Owocki and A. J. Hundhausen.* **274**, 414, 128-C3 (1983)
- The Solar Wind Ionization State as a Coronal Temperature Diagnostic. *S. P. Owocki, T. E. Holzer, and A. J. Hundhausen.* **275**, 354, 140-G6 (1983)
- HUNSTEAD, R. W. 1107 + 036: An Unusual QSO-Galaxy Pair. *H. S. Murdoch, R. W. Hunstead, H. C. Arp, J. J. Condon, J. C. Blades, and E. M. Burbidge.* **265**, 610, 19-C4 (1983)
- HUNSTEAD, RICHARD W. C IV Absorption in the High-Redshift BL Lac Object 0215 + 015. II. New Observations at 20 km s<sup>-1</sup> Resolution. *Max Pettini, Richard W. Hunstead, Hugh S. Murdoch, and J. Chris Blades.* **273**, 436, 118-C3 (1983)
- HUNTER, D. A. NGC 1275: A Burgeoning Elliptical Galaxy. *A. Wirth, S. J. Kenyon, and D. A. Hunter.* **269**, 102, 66-A13 (1983)
- HUNTER, DEIDRE. Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. *John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson.* **274**, 125, 125-C5 (1983)
- HUNTER, DEIDRE A. Gas Kinematics and the Structures of Extragalactic Giant and Supergiant H II Regions. *J. S. Gallagher and Deidre A. Hunter.* **274**, 141, 125-D7 (1983)
- HUNTER, JAMES H., JR. The Development of Structure in Shearing, Viscous Media. II. *James H. Hunter, Jr. and Tomas Horak.* **265**, 402, 16-D12 (1983)
- HUNTRESS, WESLEY T., JR. Dependence of Interstellar Depletion on Hydrogen Column Density: Possibilities and Implications. *Shankar P. Tarafdar, Sheo S. Prasad, and Wesley T. Huntress, Jr.* **267**, 156, 41-E13 (1983)
- HURFORD, G. J. Interferometric Observations of Solar Limb Structure at 2.6 Millimeters. *P. G. Wannier, G. J. Hurford, and G. A. Seielstad.* **264**, 660, 9-D14 (1983)
- HURLEY, K. Multispacecraft Hard X-Ray Observations of Fine Time Structure in Two Solar Flares. *K. Hurley, M. Niel, R. Talon, I. V. Estulin, and V. Ch. Dolidze.* **265**, 1076, 24-E1 (1983)
- HUT, PIET. Binary-Single Star Scattering. I. Numerical Experiments for Equal Masses. *Piet Hut and John N. Bahcall.* **268**, 319, 55-D6 (1983)
- Binary-Single Star Scattering. II. Analytic Approximations for High Velocity. *Piet Hut.* **268**, 342, 55-F1 (1983)
- Binaries as a Heat Source in Stellar Dynamics: Release of Binding Energy. *Piet Hut.* **272**, L29, 105-F7 (1983)
- HUTCHINGS, J. B. Discovery of a Massive Unseen Star in LMC X-3. *A. P. Cowley, D. Crampton, J. B. Hutchings, R. Remillard, and J. E. Penfold.* **272**, 118, 102-C13 (1983)
- A New Look at BE Ursae Majoris. *D. Crampton, A. P. Cowley, and J. B. Hutchings.* **272**, 202, 103-C2 (1983)
- The 1982 Ultraviolet Eclipse of the Symbiotic Binary AR Pavonis. *J. B. Hutchings, A. P. Cowley, T. B. Ake, and C. L. Imhoff.* **275**, 271, 140-A6 (1983)
- IUE Observations of the Exciting Stars of Giant H II Regions in M33: Supermassive Stars? *Philip Massey and J. B. Hutchings.* **275**, 578, 143-G9 (1983)
- A Spectrographic Orbit for LMC X-1: Another Massive X-Ray Source? *J. B. Hutchings, D. Crampton, and A. P. Cowley.* **275**, L43, 148-B11 (1983)
- HYLAND, A. R. Infrared Observations of the Jet in M87. *R. M. Smith, G. V. Bicknell, A. R. Hyland, and T. J. Jones.* **266**, 69, 27-F4 (1983)
- The Spectral and Spatial Distribution of Radiation from Eta Carinae. III. A High-Resolution 2.2 Micron Map and Morphological Considerations of the Evolutionary Status. *R. M. Mitchell, G. Robinson, A. R. Hyland, and T. J. Jones.* **271**, 133, 89-D5 (1983)
- Infrared Spectra of WN Stars. I. HD 50896. *D. J. Hillier, T. J. Jones, and A. R. Hyland.* **271**, 221, 90-D9 (1983)
- Type II OH/IR Masers. III. The Data Base. *Terry J. Jones, A. R. Hyland, and Ian Gatley.* **273**, 660, 120-G2 (1983)
- OH/IR Masers. IV. Evolution, Pulsation, and Nature of the Sources. *Terry J. Jones, A. R. Hyland, P. R. Wood, and Ian Gatley.* **273**, 669, 121-A1 (1983)
- IBAÑEZ, MIGUEL H. Thermochemical Instabilities in Reacting Gases. I. Plasma of Hydrogen. *Miguel H. Ibañez and Antonio Parravano.* **275**, 181, 139-A11 (1983)
- IBEN, ICKO, JR. On the Evolution of Those Nuclei of Planetary Nebulae That Experience a Final Helium Shell Flash. *Icko Iben, Jr., James B. Kaler, James W. Truran, and Alvio Renzini.* **264**, 605, 9-A1 (1983)
- Carbon Star Formation and Neutron-rich Isotope Formation in Low-Mass Asymptotic Giant Branch Stars. *Icko Iben, Jr.* **275**, L65, 148-D5 (1983)
- ICHIMARU, SETSUO. Amorphous Glassy Plasma in Dense Stellar Matter. *Setsumu Ichimaru, Hiroshi Iyetomi, Shinichi Mitake, and Naoki Itoh.* **265**, L83, 26-D11 (1983)
- Enhancement of Thermonuclear Reaction Rate Due to Screening by Relativistic Degenerate Electrons. *Setsumu Ichimaru and Kenichi Utsami.* **269**, L51, 76-B11 (1983)
- Electrical and Thermal Conductivities of Dense Matter in the

- Liquid Metal Phase. I. High-Temperature Results. *Naoki Itoh, Shinichi Mitake, Hiroshi Iyetomi, and Setsuo Ichimaru*. **273**, 774, 122-A10 (1983)
- ICKE, VINCENT. A Clamshell for Blandford-Rees Jets. *Vincent Icke*. **265**, 648, 19-F4 (1983)
- IKEUCHI, SATORU. The Structure and Expansion Law of a Shock Wave in an Expanding Universe. *Satoru Ikeuchi, Kohji Tomisaka, and Jeremiah P. Ostriker*. **265**, 583, 19-A5 (1983)
- Physical Properties of the Intergalactic Medium and the Lyman-Alpha Absorbing Clouds. *Jeremiah P. Ostriker and Satoru Ikeuchi*. **268**, L63, 63-D9 (1983)
- ILLING, R. The Association of Radio Noise Storm Enhancements with the Appearance of Additional Material in the Corona. *A. Kerdraon, M. Pick, G. Trotter, C. Sawyer, R. Illing, W. Wagner, and L. House*. **265**, L19, 18-F1 (1983)
- ILLINGWORTH, GARTH. The  $L \propto \sigma^2$  Relation for the Bulge Components of Disk Galaxies. *John Kormendy and Garth Illingworth*. **265**, 632, 19-D13 (1983)
- The Kinematic Properties of Faint Elliptical Galaxies. *Roger L. Davies, George Efsthathiou, S. Michael Fall, Garth Illingworth, and Paul L. Schechter*. **266**, 41, 27-D4 (1983)
- Dynamics of Yet More Ellipticals and Bulges. *Roger L. Davies and Garth Illingworth*. **266**, 516, 34-A1 (1983)
- The Kinematics of Globular Clusters in the Large Magellanic Cloud. *K. C. Freeman, Garth Illingworth, and Augustus Oemler, Jr.* **272**, 488, 107-B7 (1983)
- IMAMURA, JAMES N. X-Ray Spectra and Light Curves of Accreting Magnetic Degenerate Dwarfs. *James N. Imamura and Richard H. Durisen*. **268**, 291, 55-B4 (1983)
- Self-similar Solutions for the Interaction Regions of Colliding Winds. *Roger A. Chevalier and James N. Imamura*. **270**, 554, 84-B13 (1983)
- IMHOFF, C. L. The 1982 Ultraviolet Eclipse of the Symbiotic Binary AR Pavonis. *J. B. Hutchings, A. P. Cowley, T. B. Ake, and C. L. Imhoff*. **275**, 271, 140-A6 (1983)
- IMPEY, C. Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea*. **274**, 101, 125-A9 (1983)
- INOUE, H. *see also* LAWRENCE, A., *et al.*
- INOUE, H. Observations of Centaurus X-3 by Hakucho. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo*. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo*. **267**, 310, 43-C6 (1983)
- IONSON, JAMES A. Electrodynamical Coupling in Magnetically Confined X-Ray Plasmas of Astrophysical Origin. *James A. Ionson*. **271**, 778, 98-A6 (1983)
- IP, W.-H. On Photochemical Heating of Cometary Comae: The Cases of H<sub>2</sub>O and CO-rich Comets. *W.-H. Ip*. **264**, 726, 10-C4 (1983)
- IPSER, JAMES R. Comptonization Effects in Spherical Accretion onto Black Holes. *James R. Ipser and Richard H. Price*. **267**, 371, 43-G11 (1983)
- On the Effects of Strong Encounters in Stellar Systems. I. A Basis for Treating Anisotropic Systems. *James R. Ipser and Roberto Semenzato*. **271**, 294, 91-B13 (1983)
- IRVINE, W. M. The  $[\text{HCO}^+]/[\text{HOC}^+]$  Abundance Ratio in Molecular Clouds. *R. C. Woods, C. S. Gudeman, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarson, L.-Å. Nyman, and H. Olofsson*. **270**, 583, 84-D14 (1983)
- IRVINE, WILLIAM M. Observations of Sulfur Dioxide in the Kleinmann-Low Nebula. *F. Peter Schloerb, Per Friberg, Åke Hjalmarson, Bertil Höglund, and William M. Irvine*. **264**, 161, 2-F1 (1983)
- ISERN, J. Collapse and Explosion of White Dwarfs. I. Precollapse Evolution. *J. Isern, J. Labay, M. Hernanz, and R. Canal*. **273**, 320, 115-F8 (1983)
- ISRAEL, F. P. The Molecular Cloud Complex Associated with ON 1. *F. P. Israel and H. A. Wootten*. **266**, 580, 34-E10 (1983)
- ISRAEL, M. H. Cosmic-Ray Abundances of Sn, Te, Xe, and Ba Nuclei Measured on HEAO 3. *W. R. Binns, R. K. Finkle, T. L. Garrard, M. H. Israel, J. Klarmann, K. E. Krombel, E. C. Stone, and C. J. Waddington*. **267**, L93, 51-B12 (1983)
- ITO, NAOKI. Amorphous Glassy Plasma in Dense Stellar Matter. *Setsuo Ichimaru, Hiroshi Iyetomi, Shinichi Mitake, and Naoki Itoh*. **265**, L83, 26-D11 (1983)
- Electrical and Thermal Conductivities of Dense Matter in the Liquid Metal Phase. I. High-Temperature Results. *Naoki Itoh, Shinichi Mitake, Hiroshi Iyetomi, and Setsuo Ichimaru*. **273**, 774, 122-A10 (1983)
- Neutrino-Pair Bremsstrahlung in Dense Stars. I. Liquid Metal Case. *Naoki Itoh and Yasuhiro Kohyama*. **275**, 858, 147-A1 (1983)
- IWAMOTO, NAOKI. Electron Kinetic Equations for Comptonization by Isotropic Photons. *Naoki Iwamoto*. **265**, 1021, 24-A1 (1983)
- IYETOMI, HIROSHI. Amorphous Glassy Plasma in Dense Stellar Matter. *Setsuo Ichimaru, Hiroshi Iyetomi, Shinichi Mitake, and Naoki Itoh*. **265**, L83, 26-D11 (1983)
- Electrical and Thermal Conductivities of Dense Matter in the Liquid Metal Phase. I. High-Temperature Results. *Naoki Itoh, Shinichi Mitake, Hiroshi Iyetomi, and Setsuo Ichimaru*. **273**, 774, 122-A10 (1983)
- JACOBSON, A. S. The State of Cygnus X-1. *J. C. Ling, W. A. Mahoney, W. A. Wheaton, A. S. Jacobson, and L. Kaluzienski*. **275**, 307, 140-D1 (1983)
- JACOBY, GEORGE. H $\alpha$  Observations of Four Novae in M31. *Robin Ciardullo, Holland Ford, and George Jacoby*. **272**, 92, 102-A11 (1983)
- JACOBY, GEORGE H. The Hydrogen-depleted Planetary Nebulae Abell 30 and Abell 78. *George H. Jacoby and Holland C. Ford*. **266**, 298, 30-B13 (1983)
- JAFFE, D. T. Submillimeter Observations of W3. *D. T. Jaffe, R. H. Hildebrand, Jocelyn Keene, and S. E. Whitcomb*. **273**, L89, 123-C11 (1983)
- Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. *Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic*. **274**, L43, 129-D3 (1983)
- JANES, KENNETH. The Ages and Compositions of Old Clusters. *Kenneth Janes and Pierre Demarque*. **264**, 206, 3-B6 (1983)
- JARVIS, J. F. Alignment of Faint Galaxy Images: Cosmological Distortion and Rotation. *F. Valdes, J. A. Tyson, and J. F. Jarvis*. **271**, 431, 94-B5 (1983)
- JAUNCEY, D. L. *see also* LAWRENCE, A., *et al.*
- JAUNCEY, D. L. Detection of 21 Centimeter Absorption at  $Z \approx 1.94$  in the QSO PKS 1157+014: Erratum. *A. M. Wolfe, F. H. Briggs, and D. L. Jauncey*. **267**, 891, 50-D13 (1983) (Orig. paper in **248**, 460, 86-F1)
- The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L.*

- Jauncey, and David F. Malin. **269**, 375, 70-E2 (1983)
- JAUNCEY, DAVID L. VLBI Observations of the Nucleus of Centaurus A. Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Batt, R. F. Haynes, Alan E. Wright, and George D. Nicolson. **266**, L93, 39-B8 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Batt, R. F. Haynes, Alan E. Wright, and George D. Nicolson. **268**, L23, 57-B13 (1983)
- A Statistical VLBI Study of Milli-Arcsecond Cores in Extragalactic Radio Sources. Robert A. Preston, David D. Morabito, and David L. Jauncey. **269**, 387, 70-F8 (1983)
- JEFFERIES, J. T. Submillimeter Extensions of the Solar Limb Determined from Observations of the Total Eclipse of 1982 July 31. C. Lindsey, E. E. Becklin, J. T. Jeffries, F. Q. Orrall, M. W. Werner, and Ian Gatley. **264**, L25, 5-B9 (1983)
- JEFFRIES, A. D. A Search for the Sunyaev-Zeldovich Effect at Millimeter Wavelengths. S. S. Meyer, A. D. Jeffries, and R. Weiss. **271**, L1, 93-A2 (1983)
- JENKINS, E. B. Interstellar Abundances of Oxygen and Nitrogen. D. G. York, L. Spitzer, R. C. Bohlin, J. Hill, E. B. Jenkins, B. D. Savage, and T. P. Snow. **266**, L55, 32-D8 (1983)
- Two-dimensional Spectrophotometry of the Cores of X-Ray Luminous Clusters. L. L. Cowie, E. M. Hu, E. B. Jenkins, and D. G. York. **272**, 29, 101-C6 (1983)
- The Filaments of NGC 1275: A Collision between a Galaxy and an Accretion Flow? E. M. Hu, L. L. Cowie, P. Kaaret, E. B. Jenkins, D. G. York, and F. L. Roesler. **275**, L27, 148-A4 (1983)
- JENKINS, EDWARD B. Copernicus Observations of C I: Pressures and Carbon Abundances in Diffuse Interstellar Clouds. Edward B. Jenkins, Michael Jura, and Michael Loewenstein. **270**, 88, 78-A1 (1983)
- A Survey of Ultraviolet Interstellar Absorption Lines. Ralph C. Bohlin, Jesse K. Hill, Edward B. Jenkins, Blair D. Savage, Theodore P. Snow, Jr., Lyman Spitzer, Jr., and Donald G. York. **51**, 277, 6-B1 (1983) (Abstr. in **265**, 1135, 25-B11)
- JENNINGS, D. E. Measurements of Stratospheric Ethane in the Jovian South Polar Regions from Infrared Heterodyne Spectroscopy of the  $\nu_2$  Band near 12 Microns. T. Kostiuik, M. J. Mumma, F. Espenak, D. Deming, D. E. Jennings, W. Maguire, and D. Zipoy. **265**, 564, 18-B9 (1983)
- Diode Laser Heterodyne Observations of Silicon Monoxide in Sunspots: A Test of Three Sunspot Models. D. A. Glenar, D. Deming, D. E. Jennings, T. Kostiuik, and M. J. Mumma. **269**, 309, 68-E4 (1983)
- JENNINGS, MARK C. An Optical Test for the Distance of Gamma-Ray Burst Sources. Mark C. Jennings. **273**, 309, 115-E11 (1983)
- JENNINGS, R. E. IR Maps of M17 in the [O III] 88 Micron and 52 Micron Lines and [N III] 57 Micron Line Measurements. R. J. Emery, D. A. Naylor, B. Fitton, I. Furniss, R. E. Jennings, and K. J. King. **268**, 721, 61-A12 (1983)
- JENSEN, K. A. Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. K. O. Mason, J. Middle-ditch, F. A. Córdova, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer. **264**, 575, 8-E6 (1983)
- The Correlated X-Ray and Optical Time Variability of TT Arietis. K. A. Jensen, France A. Córdova, J. Middle-ditch, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer. **270**, 211, 79-B14 (1983)
- HEAO A-2 Soft X-Ray Source Catalog. J. J. Nugent, K. A. Jensen, J. A. Nousek, G. P. Garmire, K. O. Mason, F. M. Walter, C. S. Bowyer, R. A. Stern, and G. R. Riegler. **51**, 1, 1-A2 (1983) (Abstr. in **263**, 1007, 142-F8)
- JERNIGAN, G. Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Mat-suoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs. **271**, 793, 98-B8 (1983)
- JERNIGAN, J. G. Discovery of 13.5 s X-Ray Pulsations from LMC X-4 and an Orbital Determination. R. L. Kelley, J. G. Jernigan, A. Levine, L. D. Petro, and S. Rappaport. **264**, 568, 8-D13 (1983)
- JERNIGAN, T. E. Analysis of the Konus Catalog of Gamma-Ray Bursts with the Thermal Synchrotron Model. E. P. Liang, T. E. Jernigan, and R. Rodrigues. **271**, 766, 97-G5 (1983)
- JESKE, N. The QSO 1156+295: A Multifrequency Study of Recent Activity. Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea. **274**, 101, 125-A9 (1983)
- JEWELL, P. R. Methanol in Orion A: Simultaneous Observations of Corresponding Rotational Transitions in the Ground and Torsionally Excited States. J. M. Hollis, F. J. Lovas, R. D. Suenram, P. R. Jewell, and L. E. Snyder. **264**, 543, 8-C2 (1983)
- JEWITT, D. C. Distribution of Forbidden Neutral Carbon Emission in the Ring Nebula (NGC 6720). D. C. Jewitt, P. N. Kufnerman, G. E. Danielson, and S. P. Maran. **268**, 683, 60-E13 (1983)
- JOHNSON, DOUGLAS W. VLA Observations of the Neutral Hydrogen Content of NGC 185 and NGC 205. Douglas W. Johnson and S. T. Gottesman. **275**, 549, 143-D14 (1983)
- JOHNSON, H. R. The Detection of H<sub>2</sub> in Cool Carbon Stars. H. R. Johnson, J. H. Goebel, D. Goorvitch, and S. T. Ridgway. **270**, L63, 87-C9 (1983)
- JOHNSON, HOLLIS R. The Ultraviolet Spectra of Three N-Type Carbon Stars. Hollis R. Johnson and George T. O'Brien. **265**, 952, 23-B14 (1983)
- Effect of Molecules and Grains on Rosseland Mean Opacities. David R. Alexander, Hollis R. Johnson, and Roger L. Rympa. **272**, 773, 110-B11 (1983)
- JOHNSON, HUGH M. Origins and Ages of X-Ray-Luminous Dwarf M Stars. Hugh M. Johnson. **273**, 702, 121-C7 (1983)
- Predicted Infrared Brightness of Stars within 25 Parsecs of the Sun. Hugh M. Johnson and Christine D. Wright. **53**, 643, 25-D8 (1983) (Abstr. in **273**, 840, 122-F10)
- JOHNSON, JAMES R. The NH<sub>3</sub> Spectrum in Saturn's 5 Micron Window. Uwe Fink, Harold P. Larson, Gordon L. Bjoraker, and James R. Johnson. **268**, 880, 62-F5 (1983)
- The 0.9-2.5 Micron Spectrum of Comet West 1976 VI. James R. Johnson, Uwe Fink, and Harold P. Larson. **270**, 769, 86-D10 (1983)
- JOHNSON, M. W. A Survey by HEAO 1 of Clusters of Galaxies. III. The Complete Abell Catalog. M. W. Johnson, R. G. Cruddace, M. P. Ulmer, M. P. Kowalski, and K. S. Wood. **266**, 425, 33-A5 (1983)
- JOHNSON, ROBERT E. A Deficiency of O III in the Io Plasma Torus. Robert A. Brown, Donald E. Shemansky, and Robert E. Johnson. **264**, 309, 4-B14 (1983)
- JOHNSTON, K. Optical and Radio Structure of the Quasar PKS 0812+02. S. Wyckoff, K. Johnston, F. Ghigo, L. Rudnick, P. Wehinger, and A. Boksenberg. **265**, 43, 12-E4 (1983)



- JOHNSTON, K. J. 3C 395—A Quasar with Asymmetrical Radio Structure. *K. J. Johnston, J. H. Spencer, A. Witzel, and E. B. Fomalont*. **265**, L43, 26-A11 (1983)
- The Arc Second Radio Structure of 12 BL Lacertae Objects. *J. S. Ulvestad, K. J. Johnston, and K. W. Weiler*. **266**, 18, 27-B9 (1983)
- VLA Observations of the  $^2\pi_{3/2}J=3/2$  Masers Associated with Orion A. *S. S. Hansen and K. J. Johnston*. **267**, 625, 47-E13 (1983)
- The Gas Density and Distribution within 2 Parsecs of the Galactic Center. *Robert L. Brown and K. J. Johnston*. **268**, L85, 63-F1 (1983)
- The Distribution of 6 Centimeter  $\text{H}_2\text{CO}$  in Orion Molecular Cloud I. *K. J. Johnston, Patrick Palmer, T. L. Wilson, and J. H. Bieging*. **271**, L89, 100-D2 (1983)
- The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35$  c. *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming*. **273**, L65, 123-B3 (1983)
- Circumstellar Envelope Structure of Late-Type Stars. *P. F. Bowers, K. J. Johnston, and J. H. Spencer*. **274**, 733, 133-D4 (1983)
- JOKIPII, J. R. Effects of Drift on the Transport of Cosmic Rays. VI. A Three-dimensional Model including Diffusion. *J. Kóta and J. R. Jokipii*. **265**, 573, 18-C4 (1983)
- Modeling of Steady, Rotational, Transonic Winds from Rotating Stars and Galaxies. *D. A. Kopriva and J. R. Jokipii*. **267**, 62, 40-F3 (1983)
- JONES, A. W. see LAWRENCE, A., et al.
- JONES, B. F. The Astrometric Position of T Tauri and the Nature of Its Companion. *Robert B. Hanson, B. F. Jones, and D. N. C. Lin*. **270**, L27, 81-B13 (1983)
- JONES, BURTON F. Lithium Abundance and Age Spread in the Pleiades. *Douglas K. Duncan and Burton F. Jones*. **271**, 663, 96-F9 (1983)
- Rapid Rotation among Pleiades K Dwarfs. *David R. Soderblom, Burton F. Jones, and Merle F. Walker*. **274**, L37, 129-C12 (1983)
- JONES, C. The X-Ray Morphology of Abell 1367. *J. Bechtold, W. Forman, R. Giacconi, C. Jones, J. Schwarz, W. Tucker, and L. Van Speybroeck*. **265**, 26, 12-C7 (1983)
- JONES, T. J. Infrared Observations of the Jet in M87. *R. M. Smith, G. V. Bicknell, A. R. Hyland, and T. J. Jones*. **266**, 69, 27-F4 (1983)
- The Spectral and Spatial Distribution of Radiation from Eta Carinae. III. A High-Resolution 2.2 Micron Map and Morphological Considerations of the Evolutionary Status. *R. M. Mitchell, G. Robinson, A. R. Hyland, and T. J. Jones*. **271**, 133, 89-D5 (1983)
- Infrared Spectra of WN Stars. I. HD 50896. *D. J. Hillier, T. J. Jones, and A. R. Hyland*. **271**, 221, 90-D9 (1983)
- JONES, T. W. Simultaneous Visual-Infrared Polarimetry of QSOs. *J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti*. **265**, 625, 19-D6 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. *R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek*. **268**, 68, 52-F3 (1983)
- JONES, TERRY J. Type II OH/IR Masers. III. The Data Base. *Terry J. Jones, A. R. Hyland, and Ian Gatley*. **273**, 660, 120-G2 (1983)
- OH/IR Masers. IV. Evolution, Pulsation, and Nature of the Sources. *Terry J. Jones, A. R. Hyland, P. R. Wood, and Ian Gatley*. **273**, 669, 121-A1 (1983)
- JORDAN, CAROLE. Outer Atmospheres of Cool Stars. XV. High-Dispersion Ultraviolet Studies of Active Chromosphere G-K Dwarfs. *Thomas R. Ayres, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, and Alexander Brown*. **274**, 784, 134-A1 (1983)
- Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold*. **274**, 801, 134-B5 (1983)
- JOSAFATSSON, KARL. Hydromagnetic Wave Dissipation in Molecular Clouds. *Ellen G. Zweibel and Karl Josafatsson*. **270**, 511, 83-F12 (1983)
- JOSS, P. C. The Breakdown of Nuclear Quasi-Equilibrium in Highly Compact Binaries and the Origin of the 2-3 Hour Gap in the Orbital Period Distribution of Cataclysmic Variables. *P. C. Joss and S. Rappaport*. **270**, L73, 87-D3 (1983)
- A New Technique for Calculations of Binary Stellar Evolution, with Application to Magnetic Braking. *S. Rappaport, F. Verbunt, and P. C. Joss*. **275**, 713, 145-C10 (1983)
- JOSTIES, F. J. The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35$  c. *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming*. **273**, L65, 123-B3 (1983)
- JOYCE, R. R. Observations of H<sub>2</sub> Emission from Molecular Clouds and Herbig-Haro Objects. *Theodore Simon and R. R. Joyce*. **265**, 864, 22-B14 (1983)
- JUGAKU, J. see LAWRENCE, A., et al.
- JUGAKU, JUN. The Resonance Lines of Aluminum in IUE Spectra of B-Type Chemically Peculiar Stars. *Kozo Sadakane, Masahide Takada, and Jun Jugaku*. **274**, 261, 126-F2 (1983)
- JULG, ANDRÉ. Dirac's Large Numbers Hypothesis and Continuous Creation. *André Julg*. **271**, 9, 88-A14 (1983)
- JUNKKARINEN, VESA T. Spectrophotometry of the Broad Absorption-Line QSO PHL 5200. *Vesa T. Junkkarinen, E. Margaret Burbidge, and Harding E. Smith*. **265**, 51, 12-E13 (1983)
- A Non-Spherically Symmetric Model for Absorption Regions near Quasars. *Vesa T. Junkkarinen*. **265**, 73, 12-G7 (1983)
- JURA, M. Molecular Self-Shielding in the Outflows from Late-Type Stars. *M. Morris and M. Jura*. **264**, 546, 8-C5 (1983)
- The Nature of NML Cygnus. *M. Morris and M. Jura*. **267**, 179, 41-G9 (1983)
- The Dust around the Carbon Star IRC +10216. *M. Jura*. **267**, 647, 47-G8 (1983)
- Mass Loss Rates and Anisotropies in the Outflows from Late-Type Stars. *M. Jura*. **275**, 683, 145-A8 (1983)
- JURA, MICHAEL. Copernicus Observations of C I: Pressures and Carbon Abundances in Diffuse Interstellar Clouds. *Edward B. Jenkins, Michael Jura, and Michael Loewenstein*. **270**, 88, 78-A1 (1983)
- KAARET, P. The Filaments of NGC 1275: A Collision between a Galaxy and an Accretion Flow? *E. M. Hu, L. L. Cowie, P. Kaaret, E. B. Jenkins, D. G. York, and F. L. Roessler*. **275**, L27, 148-A4 (1983)
- KAFATOS, M. High Spatial Resolution VLA Observations of the R Aquarii Jet. *M. Kafatos, J. M. Hollis, and A. G. Michalitsianos*. **267**, L103, 51-C7 (1983)
- Observations of Two Peculiar Emission Objects in the Large Magellanic Cloud. *M. Kafatos, A. G. Michalitsianos, D. A. Allen, and R. E. Stencel*. **275**, 584, 144-A1 (1983)
- KAFATOS, MINAS. The High-Energy Spectrum of Hot Accretion Disks. *Jean A. Eilek and Minas Kafatos*. **271**, 804, 98-C5 (1983)
- KAHLER, S. W. Solar Proton Flares with Weak Impulsive Phases. *E. W. Cliver, S. W. Kahler, and P. S. McIntosh*. **264**, 699, 10-A2 (1983)
- KAHN, S. On Searches for Pulsed Emission with Application to

- Four Globular Cluster X-Ray Sources: NGC 1851, 6441, 6624, and 6712. D. A. Leahy, W. Darbro, R. F. Elsner, M. C. Weisskopf, P. G. Sutherland, S. Kahn, and J. E. Grindlay. **272**, 160, 28-F9 (1983)
- KAHN, S. M. X-Ray Observations of 4U 1626-67 by the Monitor Counter on the Einstein (HEAO 2) Observatory. R. F. Elsner, W. Darbro, D. Leahy, M. C. Weisskopf, P. G. Sutherland, S. M. Kahn, and J. E. Grindlay. **266**, 769, 36-F6 (1983)
- X-Ray Observations of LMC X-3 with the Monitor Proportional Counter aboard the HEAO 2 Einstein Observatory: A Comparison with Cygnus X-1. M. C. Weisskopf, S. M. Kahn, W. D. Darbro, R. F. Elsner, J. E. Grindlay, S. Naranan, P. G. Sutherland, and A. C. Williams. **274**, L65, 136-B7 (1983)
- KAHN, STEVEN M. The Soft X-Ray Spectrum of the Vela Supernova Remnant. Steven M. Kahn, Jean Brodie, Stuart Bowyer, and Philip A. Charles. **269**, 212, 67-D12 (1983)
- KAI, K. Acceleration and Confinement of Energetic Particles in the 1980 June 7 Solar Flare. S. R. Kane, K. Kai, T. Kosugi, S. Enome, P. B. Landecker, and D. L. McKenzie. **271**, 376, 92-A14 (1983)
- KAISER, N. Cosmological Density Fluctuations and Radiation Anisotropy Generated by Pregalactic Sources of Radiation. C. J. Hogan and N. Kaiser. **274**, 7, 124-A12 (1983)
- KAISER, NICK. Constraints on Neutrino-dominated Cosmologies from Large-Scale Streaming Motion. Nick Kaiser. **273**, L17, 117-C4 (1983)
- KAITCHUCK, RONALD H. Time-resolved Spectrophotometry of the Nova-like Variable RW Trianguli. Ronald H. Kaitchuck, R. Kent Honeycutt, and Eric M. Schlegel. **267**, 239, 42-E1 (1983)
- Time-resolved Spectrophotometry of the Nova-like Variable US Ursae Majoris. Eric M. Schlegel, R. Kent Honeycutt, and Ronald H. Kaitchuck. **53**, 397, 22-A5 (1983) (Abstr. in **272**, 786, 110-C11)
- KALER, JAMES B. A Photometric Survey of Compact and Selected Planetary Nebulae. James B. Kaler. **264**, 594, 8-F13 (1983)
- On the Evolution of Those Nuclei of Planetary Nebulae That Experience a Final Helium Shell Flash. Icko Iben, Jr., James B. Kaler, James W. Truran, and Alvio Renzini. **264**, 605, 9-A1 (1983)
- The Binary Central Star of the Planetary Nebula LT-5. Walter A. Feibelman and James B. Kaler. **269**, 592, 72-G11 (1983)
- The Evolution of Large Planetary Nebulae and Their Central Stars. James B. Kaler. **271**, 188, 90-A9 (1983)
- KALLMAN, T. R. The X-Ray Absorption Spectrum of 4U 1700-37 and Its Implications for the Stellar Wind of the Companion HD 153919. N. E. White, T. R. Kallman, and J. H. Swank. **269**, 264, 68-A13 (1983)
- Photoionization Models for the Winds from Cataclysmic Variables. T. R. Kallman. **272**, 238, 103-E10 (1983)
- KALLMAN, TIMOTHY R. X-Ray Ionization and the Orion Molecular Cloud. Julian H. Krolik and Timothy R. Kallman. **267**, 610, 47-D12 (1983)
- A Search for X-Rays from Runaway Stars. C. Krishna Kumar, Timothy R. Kallman, and Roger J. Thomas. **272**, 219, 103-D5 (1983)
- KALUZIENSKI, L. The State of Cygnus X-1. J. C. Ling, W. A. Mahoney, W. A. Wheaton, A. S. Jacobson, and L. Kaluzienski. **275**, 307, 140-D1 (1983)
- KAMPER, KARL W. Optical Studies of Cassiopeia A. VI. Observations during the Period 1976-1980. Sidney van den Bergh and Karl W. Kamper. **268**, 129, 53-C9 (1983)
- KÄMPFER, N. Observed Time Delays between Solar H $\alpha$  Flares and Microwave Bursts as Evidence for Various Energy Transport Mechanisms. N. Kämpfer and A. Magun. **274**, 910, 135-D5 (1983)
- KANBACH, G. Gamma-Ray Observational Constraints on the Origin of the Optical Continuum Emission from the White-Light Flare of 1980 July 1. J. M. Ryan, E. L. Chupp, D. J. Forrest, S. M. Matz, E. Rieger, C. Reppin, G. Kanbach, and G. H. Share. **272**, L61, 111-B8 (1983)
- Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills. **274**, 231, 126-C13 (1983)
- KANDRUP, HENRY E. Pair Correlations in an Expanding Universe for a Multicomponent System. Henry E. Kandrup. **272**, 1, 101-A6 (1983)
- KANE, S. R. Acceleration and Confinement of Energetic Particles in the 1980 June 7 Solar Flare. S. R. Kane, K. Kai, T. Kosugi, S. Enome, P. B. Landecker, and D. L. McKenzie. **271**, 376, 92-A14 (1983)
- KÄPPELER, F. Isotopic Neon Cross Sections for a Study of Neutron Balance and Temperature during s-Process Nucleosynthesis. J. Almeida and F. Käppeler. **265**, 417, 16-E13 (1983)
- KAPRANIDIS, STELIOS. Model Atmospheres of Red Degenerate Stars. Stelios Kapranidis. **275**, 342, 140-F8 (1983)
- KASTNER, S. O. The Solar O III Spectrum. II. Longer Wavelengths, Line Widths, and the He II Lyman  $\alpha$  Radiation Field. S. O. Kastner, W. E. Behring, and A. K. Bhatia. **53**, 129, 18-C6 (1983) (Abstr. in **271**, 892, 99-B14)
- KASTNER, SIDNEY O. New Identifications of Allowed  $2p^3/2-2p^3/1$  Transitions and Forbidden  $2p^3/2(P_{1/2}-P_{3/2})$  Coronal Lines in the Ne I Sequence. Sidney O. Kastner. **275**, 922, 147-E9 (1983)
- KATGERT, P. Einstein X-Ray Observations of Optical-Radio Selected Areas. P. Katgert, Trinh X. Thuan, and Rogier A. Windhorst. **275**, 1, 137-A6 (1983)
- KATTENBERG, ARIE. 6 Centimeter Observations of Solar Bursts with 0.1 s Time Constant and Arcsec Resolution. Arie Kattenberg and Marc Allaart. **265**, 535, 17-G8 (1983)
- KATZ, J. Stability Limits for "Isothermal" Cores in Globular Cluster Models: Two-Component Systems. J. Katz and L. G. Taff. **264**, 476, 7-E2 (1983)
- KATZ, J. I. The Eddington Limit and Supercritical Accretion. II. Time-dependent Calculations. H. L. Burger and J. I. Katz. **265**, 393, 16-D3 (1983)
- The Infall of a Star into a Massive Black Hole. R. A. Nolthenius and J. I. Katz. **269**, 297, 68-D5 (1983)
- KAUFMAN, MICHELE. H II Regions and Star Formation in M83 and M33. K. S. Rumstay and Michele Kaufman. **274**, 611, 132-B3 (1983)
- KAVANAGH, R. W.  $^{26}\text{Mg}(p,n)^{26}\text{Al}$  Cross Section Measurements. R. T. Skelton, R. W. Kavanagh, and D. G. Sargood. **271**, 404, 92-C14 (1983)
- KAWAI, N. Observations of Centaurus X-3 by Hakucho. T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibasaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo. **264**, 563, 8-D8 (1983)
- KAWAMURA, H. Laboratory Detection of the  $\text{C}_3\text{N}$  and  $\text{C}_3\text{H}$  Free Radicals. C. A. Gottlieb, E. W. Gottlieb, P. Thaddeus, and H. Kawamura. **275**, 916, 147-E3 (1983)
- KAZANAS, D. On the Origin of Relativistic Particles and Gamma-Rays in Quasars. R. J. Protheroe and D. Kazanas. **265**, 620, 19-D1 (1983)
- KECSKEMETI, K. Charge Exchange in Solar Wind-Cometary Interactions. T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy. **268**, 889, 62-G1 (1983)
- Charge Exchange in Solar Wind-Cometary Interactions: Erratum. T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy. **274**, 919, 135-D14 (1983) (Orig. paper in **268**, 889, 63-A1)
- KEEL, WILLIAM. Arp 102B: A New and Unusual Broad-Line

- Galaxy. John Stauffer, Rudolph Schild, and William Keel. **270**, 465, 83-C3 (1983)
- An H $\alpha$  [N II] Survey of the Nuclei of a Complete Sample of Spiral Galaxies. William Keel. **52**, 229, 12-F8 (1983) (Abstr. in **269**, 810, 75-C9)
- KEEL, WILLIAM C. The Nature of the Ionizing Source of the Nuclear Gas in NGC 1052. William C. Keel and Joseph C. Miller. **266**, L89, 39-B4 (1983)
- The Distribution of Ionized Gas in the Nuclei of Spiral Galaxies. William C. Keel. **268**, 632, 60-A1 (1983)
- Spectroscopic Evidence for Activity in the Nuclei of Normal Spiral Galaxies. William C. Keel. **269**, 466, 71-E5 (1983)
- KEENE, JOCELYN. First Detection of the Ground-State  $J_K = 1_0 \rightarrow 0_0$  Submillimeter Transition of Interstellar Ammonia. Jocelyn Keene, Geoffrey A. Blake, and T. G. Phillips. **271**, L27, 93-B13 (1983)
- Neutral Carbon in the Egg Nebula (AFGL 2688). C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wootten, C. Masson, and M. A. Frerking. **273**, 633, 120-D13 (1983)
- Submillimeter Observations of W3. D. T. Jaffe, R. H. Hildebrand, Jocelyn Keene, and S. E. Whitcomb. **273**, L89, 123-C11 (1983)
- Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic. **274**, L43, 129-D3 (1983)
- KELLER, H. U. Lyman-Alpha Absorption of Comets West 1976 VI and P/D'Arrest 1976 XI with Copernicus. M. C. Festou, H. U. Keller, J.-L. Bertaux, and E. S. Barker. **265**, 925, 23-A1 (1983)
- KELLEY, R. L. Discovery of 13.5 s X-Ray Pulsations from LMC X-4 and an Orbital Determination. R. L. Kelley, J. G. Jernigan, A. Levine, L. D. Petro, and S. Rappaport. **264**, 568, 8-D13 (1983)
- Orbital Period Changes in Centaurus X-3. R. L. Kelley, S. Rappaport, G. W. Clark, and L. D. Petro. **268**, 790, 61-F12 (1983)
- Discovery of 9.3 s X-Ray Pulsations from 2S 1553-542 and a Determination of the Orbit. R. L. Kelley, S. Rappaport, and S. Ayasli. **274**, 765, 133-F8 (1983)
- KEMP, J. C. Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radostitz, W. C. Priedhorsky, J. Terrell, and E. N. Walker. **271**, L65, 100-B8 (1983)
- KEMP, JAMES C. X Persei: Optical Polarization Variation on the 580 Day Binary-like Period. James C. Kemp and Mark S. Barbour. **264**, 237, 3-D9 (1983)
- The Broad-Band Circular Polarization of Sunspots, 0.37-4.5 Microns. James C. Kemp and Gary D. Henson. **266**, L69, 32-E7 (1983)
- Discovery of Eclipse Polarization in Algol. James C. Kemp, Gary D. Henson, Mark S. Barbour, Daniel J. Kraus, and George W. Collins II. **273**, L85, 123-C7 (1983)
- SS 433: Improved Evidence for a Persistent 160 Day Photometric Period. Gary D. Henson, James C. Kemp, Mark S. Barbour, Daniel J. Kraus, Elia M. Leibowitz, and Tsevi Mazeh. **275**, 247, 139-F10 (1983)
- KENNICUTT, R. C., JR. The Radial Distribution of H II Regions in Spiral Galaxies. P. W. Hodge and R. C. Kennicutt, Jr. **267**, 563, 47-A5 (1983)
- KENNICUTT, ROBERT C., JR. The Spatial Distribution of H II Regions in NGC 4321. Scott Anderson, Paul Hodge, and Robert C. Kennicutt, Jr. **265**, 132, 13-E2 (1983)
- The Rate of Star Formation in Normal Disk Galaxies. Robert C. Kennicutt, Jr. **272**, 54, 101-E13 (1983)
- KENT, STEPHEN M. CCD Photometry of the Center of M31. Stephen M. Kent. **266**, 562, 34-D5 (1983)
- KENYON, S. J. NGC 1275: A Burgeoning Elliptical Galaxy. A. Wirth, S. J. Kenyon, and D. A. Hunter. **269**, 102, 66-A13 (1983)
- KENYON, SCOTT J. The Outbursts of Symbiotic Novae. Scott J. Kenyon and James W. Truran. **273**, 280, 115-C10 (1983)
- KEPLER, S. O. The Light Curve of the ZZ Ceti Star G226-29. S. O. Kepler, E. L. Robinson, and R. E. Nather. **271**, 744, 97-E11 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- KERDRAON, A. The Association of Radio Noise Storm Enhancements with the Appearance of Additional Material in the Corona. A. Kerdraon, M. Pick, G. Trotet, C. Sawyer, R. Illing, W. Wagner, and L. House. **265**, L19, 18-F1 (1983)
- KERN, JANET T. A uvby  $\beta$  Photometric Survey of Southern Hemisphere Eclipsing Binary Stars. George W. Wolf and Janet T. Kern. **52**, 429, 16-B7 (1983) (Abstr. in **270**, 780, 86-E7)
- KHANDKER, A. Absorption of Radiation Propagating Obliquely in a Magnetoplasma. A. Khandker, R. F. O'Connell, and G. W. Ford. **269**, 668, 73-F11 (1983)
- KING, J. D. Rates for Some Reactions in the Mass Range  $39 \leq A \leq 45$ . M. A. Buckby and J. D. King. **264**, 278, 3-G9 (1983)
- KING, K. J. IR Maps of M17 in the [O III] 88 Micron and 52 Micron Lines and [N III] 57 Micron Line Measurements. R. J. Emery, D. A. Naylor, B. Fitton, I. Furniss, R. E. Jennings, and K. J. King. **268**, 721, 61-A12 (1983)
- KINGSTON, A. E. Si III Line Ratios in the Sun. P. L. Dufton, A. Hibbert, A. E. Kingston, and G. A. Doschek. **274**, 420, 128-C9 (1983)
- KINNEY, A. L. Multifrequency Observations of the Flaring Quasar 1156+295. A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea. **274**, 101, 125-A9 (1983)
- KIPLINGER, ALAN L. Millisecond Time Variations in Hard X-Ray Solar Flares. Alan L. Kiplinger, B. R. Dennis, A. Gordon Emslie, K. J. Frost, and L. E. Orwig. **265**, L99, 26-E11 (1983)
- Recurrent Pulse Trains in the Solar Hard X-Ray Flare of 1980 June 7. Alan L. Kiplinger, B. R. Dennis, K. J. Frost, and L. E. Orwig. **273**, 783, 122-B6 (1983)
- KIRK, J. G. Accreting X-Ray Pulsar Atmospheres Heated by Coulomb Deceleration of Protons. P. Mészáros, A. K. Harding, J. G. Kirk, and D. J. Galloway. **266**, L33, 32-C3 (1983)
- KIRSHNER, ROBERT P. The Extraordinary Extragalactic Supernova Remnant in NGC 4449. II. X-Ray and Optical Investigations. William P. Blair, Robert P. Kirshner, and P. Frank Winkler, Jr. **272**, 84, 102-A3 (1983)
- KISLYAKOV, A. G. CO Emission in Directions of Some Millimeter Wavelength Continuum Sources. A. G. Kislyakov and M. A. Gordon. **265**, 766, 21-B5 (1983)
- KLARMANN, J. Cosmic-Ray Abundances of Sn, Te, Xe, and Ba Nuclei Measured on HEAO 3. W. R. Binns, R. K. Fickle, T. L. Garrard, M. H. Israel, J. Klarmann, K. E. Krombel, E. C. Stone, and C. J. Waddington. **267**, L93, 51-B12 (1983)
- KLEBESADEL, R. W. Observations of Two Gamma-Ray Bursts by Vela X-Ray Detectors: Erratum. J. Terrell, E. E. Fenimore, R. W. Klebesadel, and U. D. Desai. **269**, 806, 75-C5 (1983) (Orig. paper in **254**, 279, 29-A12)

- KLEIN, RICHARD I. Star Formation within OB Subgroups: Implosion by Multiple Sources. *Richard I. Klein, Maxwell T. Sandford II, and Rodney W. Whitaker*. **271**, L69, 100-B12 (1983)
- KLEINMANN, S. G. The Circumstellar and Nebular Environment of the Becklin-Neugebauer Object:  $\lambda = 2-5$  Micron Spectroscopy. *N. Scoville, S. G. Kleinmann, D. N. B. Hall, and S. T. Ridgway*. **275**, 201, 139-C3 (1983)
- KLEPCZYNSKI, W. J. The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35$  c. *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming*. **273**, L65, 123-B3 (1983)
- KLIMCHUK, J. A. Outflow from the Sun's Polar Corona. *F. Q. Orrall, G. J. Rottman, and J. A. Klimchuk*. **266**, L65, 32-E3 (1983)
- KLIMKE, A. Detection of Flarelike Events and Their Relationship to Presumed Spot Regions of V471 Tauri: A Solar-Stellar Connection. *Arthur Young, A. Klimke, John L. Africano, Rob Quigley, Richard R. Radick, and Dave Van Buren*. **267**, 655, 48-A3 (1983)
- Observations of Active Chromosphere Stars. *Bernard W. Bopp, John L. Africano, R. E. Stencel, P. V. Noah, and A. Klimke*. **275**, 691, 145-B2 (1983)
- KNAPP, G. R. The H I Content of Envelopes around Evolved Stars. *G. R. Knapp and P. F. Bowers*. **266**, 701, 36-A5 (1983)
- Mass Loss from Evolved Stars. II. Radio Continuum Emission and Evolution to Planetary Nebulae. *D. N. Spergel, J. L. Giuliani, Jr., and G. R. Knapp*. **275**, 330, 140-E10 (1983)
- Regions of Low Molecular Column Density Near the Galactic Plane. *F. Verter, G. R. Knapp, A. A. Stark, and R. W. Wilson*. **52**, 289, 13-D8 (1983) (Abstr. in **269**, 809, 75-C8)
- KNAPP, GILLIAN. Spectral Energy Distributions of Young Stellar Objects. I. A Turbulent Model for DR Tauri. *Roger K. Ulrich, Allen W. Shafter, George Hawkins, and Gillian Knapp*. **267**, 199, 42-B2 (1983)
- The Structure of Bright-rimmed Molecular Clouds. *Alwyn Wootten, Annela Sargent, Gillian Knapp, and P. J. Hugrins*. **269**, 147, 66-F4 (1983)
- KNIFFEN, D. A. Measurements of Galactic Plane Gamma-Ray Emission in the Energy Range 10-80 MeV. *D. L. Bertsch and D. A. Kniffen*. **270**, 305, 80-C2 (1983)
- KNOWLES, S. H. Far-Infrared and Submillimeter Observations of Stellar Radiative and Wind Heating in S140 IRS. *P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles*. **271**, 625, 96-C13 (1983)
- KOBAYASHI, Y. *see* LAWRENCE, A., *et al.*
- KOCH-MIRAMOND, LYDIE. Einstein Observations of the Rho Ophiuchi Dark Cloud: An X-Ray Christmas Tree. *Thierry Montmerle, Lydie Koch-Miramond, Edith Falgarone, and Jonathan E. Grindlay*. **269**, 182, 67-A11 (1983)
- KODAIRA, K. Diameter versus Surface Brightness Diagram of Galaxies. *K. Kodaira, S. Okamura, and M. Watanabe*. **274**, L49, 136-A4 (1983)
- KOENIGSBERGER, G. Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. *M. Garcia, S. L. Baliunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson*. **267**, 291, 43-A13 (1983)
- X-Ray Properties of the Be/X-Ray System 2S 0114+650 = LSI + 65°010. *G. Koenigsberger, J. H. Swank, A. E. Szymkowiak, and N. E. White*. **268**, 782, 61-F4 (1983)
- KOHYAMA, YASUOHARU. Neutrino-Pair Bremsstrahlung in Dense Stars. I. Liquid Metal Case. *Naoki Itoh and Yasuharu Kohyama*. **275**, 858, 147-A1 (1983)
- KONDO, I. *see also* LAWRENCE, A., *et al.*
- KONDO, I. Observations of Centaurus X-3 by Hakucho. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo*. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo*. **267**, 310, 43-C6 (1983)
- KONDO, YOJI. IUE Observations of Gas Stream Effects in the Ultraviolet Spectrum of U Cephei: Erratum. *Yoji Kondo, George E. McCluskey, and Robert E. Stencel*. **264**, 746, 10-D10 (1983) (Orig. paper in **233**, 906, 103-D11)
- HD 207739: A Strange Composite Star. *Sidney B. Parsons, Albert V. Holm, and Yoji Kondo*. **264**, L19, 5-B4 (1983)
- International Ultraviolet Explorer Observations of the Peculiar Variable Spectrum of the Eclipsing Binary R Arae. *George E. McCluskey and Yoji Kondo*. **266**, 755, 36-E6 (1983)
- Mass Loss, Levitation, Accretion, and the Sharp-Lined Features in Hot White Dwarfs. *Frederick C. Bruhweiler and Yoji Kondo*. **269**, 657, 73-E14 (1983)
- The Partial Phase of the Eclipse of Epsilon Aurigae. *Robert D. Chapman, Yoji Kondo, and Robert E. Stencel*. **269**, L17, 69-B3 (1983)
- On the Clock Mechanism and the Implausibility of the 35 Day Precessing Disk in HZ Herculis/Hercules X-1. *Yoji Kondo, Thomas C. Van Flandern, and Charles L. Wolff*. **273**, 716, 121-D8 (1983)
- KÖNIGL, ARIEH. Kinematics of the Optical Filaments in W50. *Tsevi Mazeh, Luis A. Aguilar, Richard R. Treffers, Arie König, and Linda S. Sparke*. **265**, 235, 14-F5 (1983)
- The Discovery of Optical Emission Knots in the Inner Jet of Centaurus A. *Jean Brodie, Arie König, and Stuart Bowyer*. **273**, 154, 113-G7 (1983)
- KOOMEN, M. J. Associations between Coronal Mass Ejections and Soft X-Ray Events. *N. R. Sheeley, Jr., R. A. Howard, M. J. Koomen, and D. J. Michels*. **272**, 349, 104-G1 (1983)
- KOPRIVA, D. A. Modeling of Steady, Rotational, Transonic Winds from Rotating Stars and Galaxies. *D. A. Kopriva and J. R. Jokipii*. **267**, 62, 40-F3 (1983)
- KORMENDY, JOHN. The  $L \propto \sigma^2$  Relation for the Bulge Components of Disk Galaxies. *John Kormendy and Garth Illingworth*. **265**, 632, 19-D13 (1983)
- The Stellar Kinematics and Dynamics of Barred Galaxies. I. NGC 936. *John Kormendy*. **275**, 529, 143-C7 (1983)
- KOSTIUK, T. Measurements of Stratospheric Ethane in the Jovian South Polar Regions from Infrared Heterodyne Spectroscopy of the  $\nu_3$  Band near 12 Microns. *T. Kostiuik, M. J. Mumma, F. Espenak, D. Deming, D. E. Jennings, W. Maguire, and D. Zipoy*. **265**, 564, 18-B9 (1983)
- Diode Laser Heterodyne Observations of Silicon Monoxide in Sunspots: A Test of Three Sunspot Models. *D. A. Glenar, D. Deming, D. E. Jennings, T. Kostiuik, and M. J. Mumma*. **269**, 309, 68-E4 (1983)
- KOSUGI, T. Acceleration and Confinement of Energetic Particles in the 1980 June 7 Solar Flare. *S. R. Kane, K. Kai, T. Kosugi, S. Enome, P. B. Landecker, and D. L. McKenzie*. **271**, 376, 92-A14 (1983)
- KÓTA, J. Effects of Drift on the Transport of Cosmic Rays. VI. A Three-dimensional Model including Diffusion. *J. Kóta and J. R. Jokipii*. **265**, 573, 18-C4 (1983)
- KOTANYI, C. Einstein Observations of NGC 4438: Dynamical Ablation of Gas in the Virgo Cluster. *C. Kotanyi, J. H. van Gorkom, and R. D. Ekers*. **273**, L7, 117-B7 (1983)
- KOTANYI, C. G. Anomalous Radio Continuum Features in Edge-on Spiral Galaxies. *E. Hummel, J. H. van Gorkom, and C.*



- G. Kotanyi. **267**, L5, 45-B6 (1983)
- KOWALSKI, M. P. A Survey by *HEAO 1* of Clusters of Galaxies. III. The Complete Abell Catalog. M. W. Johnson, R. G. Cruddace, M. P. Ulmer, M. P. Kowalski, and K. S. Wood. **266**, 425, 33-A5 (1983)
- Redshift Modifications to *HEAO A-1* Cluster X-Ray Luminosities. M. P. Kowalski, M. P. Ulmer, and R. G. Cruddace. **268**, 540, 59-A1 (1983)
- KOYAMA, K. *see also* LAWRENCE, A., *et al.*
- KOYAMA, K. Observations of Centaurus X-3 by *Hakucho*. T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- KOZLOVSKY, B. Implications of High-Energy Neutron Observations from Solar Flares. R. Ramaty, R. J. Murphy, B. Kozlovsky, and R. E. Lingenfelter. **273**, L41, 117-D12 (1983)
- KRAFT, ROBERT P. Carbon and Nitrogen Abundances in Giant Stars of the Metal-poor Globular Cluster M15. Charles F. Trefzger, Duane F. Carbon, G. E. Langer, Nicholas B. Suntzeff, and Robert P. Kraft. **266**, 144, 28-E6 (1983)
- KRAUS, D. J. Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radostitz, W. C. Priedhorsky, J. Terrell, and E. N. Walker. **271**, L65, 100-B8 (1983)
- KRAUS, DANIEL J. Discovery of Eclipse Polarization in Algol. James C. Kemp, Gary D. Henson, Mark S. Barbour, Daniel J. Kraus, and George W. Collins II. **273**, L85, 123-C7 (1983)
- SS 433: Improved Evidence for a Persistent 160 Day Photometric Period. Gary D. Henson, James C. Kemp, Mark S. Barbour, Daniel J. Kraus, Elia M. Leibowitz, and Tsevi Mazeh. **275**, 247, 139-F10 (1983)
- KRAUSHAAR, W. L. The Soft X-Ray Diffuse Background. D. McCammon, D. N. Burrows, W. T. Sanders, and W. L. Kraushaar. **269**, 107, 66-B4 (1983)
- KRAUTTER, ARNO. Pressure Collimation of Supersonic Radio Jets. Arno Krautter, R. N. Henriksen, and Kayll Lake. **269**, 81, 65-G6 (1983)
- KRISHNAMOHAN, S. Intensity Dependence of the Pulse Profile and Polarization of the Vela Pulsar. S. Krishnamohan and G. S. Downs. **265**, 372, 16-B10 (1983)
- KRISHNA SWAMY, K. S. Fluorescence Excitation of CO in Comets. K. S. Krishna Swamy. **267**, 882, 50-D4 (1983)
- KRISS, G. A. The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae). G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen. **266**, 806, 37-B10 (1983)
- KRISS, GERARD A. The X-Ray Emitting Gas in Poor Clusters with Central Dominant Galaxies. Gerard A. Kriss, Denis F. Cioffi, and Claude R. Canizares. **272**, 439, 106-E7 (1983)
- KRISTIAN, JEROME. Stellar Populations in Local Group Dwarf Elliptical Galaxies. I. NGC 147. J. R. Mould, Jerome Kristian, and G. S. Da Costa. **270**, 471, 83-C10 (1983)
- KROLIK, JULIAN H. Spherical Accretion onto Quasars. Julian H. Krolik and Richard A. London. **267**, 18, 40-B9 (1983)
- X-Ray Ionization and the Orion Molecular Cloud. Julian H. Krolik and Timothy R. Kallman. **267**, 610, 47-D12 (1983)
- KROMBEL, K. E. Cosmic-Ray Abundances of Sn, Te, Xe, and Ba Nuclei Measured on *HEAO 3*. W. R. Binns, R. K. Finkle, T. L. Garrard, M. H. Israel, J. Klarmann, K. E. Krombel, E. C. Stone, and C. J. Waddington. **267**, L93, 51-B12 (1983)
- KRONBERG, PHILIPP P. Detection of  $10^6 M_{\odot}$  of Hot Gas in the Normal Elliptical Galaxy NGC 5846 with the *Einstein* Satellite. Peter Biermann and Philipp P. Kronberg. **268**, L69, 63-E1 (1983)
- KROTKOV, ROBERT. Vibrationally Excited  $\text{CH}_3\text{CN}$  and  $\text{HC}_3\text{N}$  in Orion. Paul F. Goldsmith, Robert Krotkov, Ronald L. Snell, R. D. Brown, and Peter Godfrey. **274**, 184, 125-G8 (1983)
- KRUMM, NATHAN. Effects of Environment on Neutral Hydrogen Distribution for Disk Galaxies in the Virgo Cluster Area. C. Giovanardi, George Helou, E. E. Salpeter, and Nathan Krumm. **267**, 35, 40-C13 (1983)
- KU, WILLIAM H.-M. Studies of BL Lacertae Objects with the *Einstein* X-Ray Observatory: The Absolute Volume Density. Daniel A. Schwartz and William H.-M. Ku. **266**, 459, 33-C13 (1983)
- X-Ray Survey of Clusters of Galaxies with the *Einstein* Observatory. Frank Abramopoulos and William H.-M. Ku. **271**, 446, 94-C6 (1983)
- X-Rays and Rotation among Post-T Tauri G Stars in Orion Ic. Myron A. Smith, Steven H. Pravdo, and William H.-M. Ku. **272**, 163, 102-G2 (1983)
- KUHN, J. R. Observations of Global-Scale Photospheric Fraunhofer Line Shifts. J. R. Kuhn. **264**, 689, 9-G2 (1983)
- KÜHR, H. Discovery of a Redshift  $z = 1.2$  Quasar with a Flat Radio Spectrum in the Field of the Gamma-Ray Source CG 195+04. A. F. J. Moffat, R. Schlickeiser, M. M. Shara, W. Sieber, R. Tuffs, and H. Kühr. **271**, L45, 100-A4 (1983)
- KÜHR, HELMUT. The Most Luminous Quasar: S5 0014+81. Helmut Kühr, James W. Liebert, Peter A. Strittmatter, Gary D. Schmidt, and Craig Mackay. **275**, L33, 148-B1 (1983)
- KULKARNI, SHRINIVAS R. Distance to the 1.5 Millisecond Pulsar and Other 4C 21.53 Objects. Carl Heiles, Shrinivas R. Kulkarni, Mary A. Stevens, D. C. Backer, M. M. Davis, and W. M. Goss. **273**, L75, 123-B11 (1983)
- A Survey of H I Absorption at Low Latitudes. John M. Dickey, Shrinivas R. Kulkarni, J. H. van Gorkom, and Carl E. Heiles. **53**, 591, 24-G11 (1983) (Abstr. in **273**, 840, 122-F10)
- KULKARNI, V. K. The  $V/V_{\infty}$  Test in Hoyle-Narlikar Conformal Gravity. V. K. Kulkarni and D. G. Banhatti. **274**, 469, 130-C3 (1983)
- KUMAR, C. KRISHNA. A Search for X-Rays from Runaway Stars. C. Krishna Kumar, Timothy R. Kallman, and Roger J. Thomas. **272**, 219, 103-D5 (1983)
- KUNASZ, PAUL B. Mass Loss in HR 1040 (A0 Ia): Analysis of Mg II  $\lambda 2802$  and H $\alpha$ . Paul B. Kunasz, Nancy D. Morrison, and B. Spessart. **266**, 739, 36-D4 (1983)
- Time-Dependent Scattering in Resonance Lines. Paul B. Kunasz. **271**, 321, 91-D12 (1983)
- KUNDU, M. R. Observations of H $\alpha$  and Microwave Brightening Caused by a Distant Solar Flare. M. R. Kundu, D. M. Rust, and M. Bobrowsky. **265**, 1084, 24-E9 (1983)
- A Coronal Transient Associated with a High-Speed Type II Burst. T. E. Gergely, M. R. Kundu, and E. Hildner. **268**, 403, 56-C6 (1983)
- VLA Observations of a Solar Active Region and Coronal Loops. D. McDonnell and M. R. Kundu. **269**, 698, 74-A13 (1983)
- Direct Evidence of Type III Electron Streams Propagating in Coronal Streamers. M. R. Kundu, T. E. Gergely, P. J. Turner, and R. A. Howard. **269**, L67, 76-C11 (1983)
- KUNIEDA, H. *see also* LAWRENCE, A., *et al.*
- KUNIEDA, H. Observations of Centaurus X-3 by *Hakucho*. T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N.

- Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- KUNTH, D. The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. *John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Maccacaro, I. J. Danziger, D. Kunth, and J. Lub.* **273**, 458, 118-D12 (1983)
- KUNTH, DANIEL. Spectrophotometry of 12 Metal-poor Galaxies: Implications for the Primordial Helium Abundance. *Daniel Kunth and Wallace L. W. Sargent.* **273**, 81, 113-A7 (1983)
- KUPFERMAN, P. N. Distribution of Forbidden Neutral Carbon Emission in the Ring Nebula (NGC 6720). *D. C. Jewitt, P. N. Kupferman, G. E. Danielson, and S. P. Maran.* **268**, 683, 60-E13 (1983)
- KUPFERMAN, PETER N. Two-Dimensional Photometry of Planetary Nebulae. *Peter N. Kupferman.* **266**, 689, 35-F13 (1983)
- KURTZ, NOEL L. The 157 Micron [C II] Emission from NGC 2024: Core and Halo Components. *Noel L. Kurtz, Scott D. Smyers, Ray W. Russell, Martin Harwit, and Gary Melnick.* **264**, 538, 8-B11 (1983)
- KURTZ, NOEL T. Observations of the 145.5 Micron [O I] Emission Line in the Orion Nebula. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit.* **265**, L7, 18-E5 (1983)
- The Galaxy's 157 Micron [C II] Emission: Observations by Means of a Spectroscopic Lunar Occultation Technique. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit.* **268**, L99, 63-G14 (1983)
- KWAN, JOHN. Spiral Gravitational Potentials and the Mass Growth of Molecular Clouds. *John Kwan and Francisco Valdes.* **271**, 604, 96-B5 (1983)
- Broad-Line Kinematic Models and the Forbidden Line Emission in Quasars and Seyfert Galaxies. *T. J. Carroll and John Kwan.* **274**, 113, 125-B7 (1983)
- KWITTER, KAREN B. Galactic Ring Nebulae Associated with Wolf-Rayet Stars. VIII. Summary and Atlas. *You-Hua Chu, Richard R. Treffers, and Karen B. Kwitter.* **53**, 937, 29-F8 (1983) (Abstr. in **274**, 923, 135-E4)
- KWOK, S. The Effects of Mass and Metallicity upon Planetary Nebula Formation. *K. A. Papp, C. R. Purton, and S. Kwok.* **268**, 145, 53-E9 (1983)
- KYLAFIS, NIKOLAOS D. Spectral and Temporal Effects of a Plasma Shell around an X-Ray Source. *Kar Man Chang and Nikolaos D. Kylafis.* **265**, 1005, 23-F11 (1983)
- Polarization of Interstellar Radio-Frequency Lines and Magnetic Field Direction. *Nikolaos D. Kylafis.* **267**, 137, 41-D8 (1983)
- Polarization of Interstellar Molecular Radiofrequency Absorption Lines. *Nikolaos D. Kylafis and Paul R. Shapiro.* **272**, L35, 105-F12 (1983)
- Linear Polarization of Interstellar Radio-Frequency Absorption Lines and Magnetic Field Direction. *Nikolaos D. Kylafis.* **275**, 135, 138-E4 (1983)
- LABAY, J. Collapse and Explosion of White Dwarfs. I. Pre-collapse Evolution. *J. Isern, J. Labay, M. Hernanz, and R. Canal.* **273**, 320, 115-F8 (1983)
- LA BONTE, BARRY J. Interpretation of Solar Irradiance Variations Using Ground-based Observations. *David H. Bruning and Barry J. La Bonte.* **271**, 853, 98-F12 (1983)
- LACOMBE, P. G74-7: A True DA,F (DAZ) White Dwarf. *P. Lacombe, James Liebert, F. Wesemael, and G. Fontaine.* **272**, 660, 109-A8 (1983)
- LACY, C. H. The Type I Supernova 1981b in NGC 4536: The First 100 Days. *David Branch, C. H. Lacy, Marshall L. McCall, P. G. Sutherland, A. Uomoto, J. C. Wheeler, and B. J. Willis.* **270**, 123, 78-C9 (1983)
- LACY, J. H. Infrared/Optical Energy Distributions of High-Red-shift Quasars. *B. T. Soifer, G. Neugebauer, J. B. Oke, K. Matthews, and J. H. Lacy.* **265**, 18, 12-B12 (1983)
- Identification of the Emission Features near 3.5 Microns in the Pre-Main-Sequence Star HD 97048. *F. Baas, L. J. Allamandola, T. R. Geballe, S. E. Persson, and J. H. Lacy.* **265**, 290, 15-C8 (1983)
- LADA, CHARLES J. The High-Velocity Molecular Flows near Young Stellar Objects. *John Bally and Charles J. Lada.* **265**, 824, 21-F10 (1983)
- The M17 SW Molecular Cloud. *Harley A. Thronson, Jr. and Charles J. Lada.* **269**, 175, 67-A4 (1983)
- Far-Infrared and Submillimeter Observations of Stellar Radiative and Wind Heating in S140 IRS. *P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles.* **271**, 625, 96-C13 (1983)
- Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith.* **274**, 571, 131-E1 (1983)
- The Discovery of New Embedded Sources in the Centrally Condensed Core of the Rho Ophiuchi Dark Cloud: The Formation of a Bound Cluster? *Bruce A. Wilking and Charles J. Lada.* **274**, 698, 133-A11 (1983)
- LAKE, GEORGE. The Rotation of Elliptical Galaxies: An Application of the Theory of Tidal Torques. *George Lake.* **264**, 408, 6-F11 (1983)
- Stellar and Gaseous Dynamics of Triaxial Galaxies. *George Lake and Colin Norman.* **270**, 51, 77-E2 (1983)
- LAKE, KAYL. Pressure Collimation of Supersonic Radio Jets. *Arno Krautter, R. N. Henriksen, and Kayl Lake.* **269**, 81, 65-G6 (1983)
- LAMB, D. Q. Synchronization of Magnetic Stars in Binary Systems. *F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb.* **274**, L71, 136-B12 (1983)
- LAMB, F. K. Synchronization of Magnetic Stars in Binary Systems. *F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb.* **274**, L71, 136-B12 (1983)
- LAMB, R. C. High-Resolution Radio and X-Ray Observations of the Supernova Remnant W28. *M. D. Andrews, J. P. Basart, R. C. Lamb, and R. H. Becker.* **266**, 684, 35-F8 (1983)
- An Identification for "Geminga" (2CG 195 + 04) 1E 0630 + 178: A Unique Object in the Error Box of the High-Energy Gamma-Ray Source. *G. F. Bignami, P. A. Caraveo, and R. C. Lamb.* **272**, L9, 105-D13 (1983)
- LAMBERT, DAVID L. Evidence of Non-LTE in Photospheric Lines of G and K Giants. *Jeffery A. Brown, Jocelyn Tomkin, and David L. Lambert.* **265**, L93, 26-E6 (1983)
- High-Resolution Spectra of C; Swan Bands from Comet West 1976 VI. *David L. Lambert and A. C. Danks.* **268**, 428, 56-E5 (1983)
- Do All Barium Stars Have a White Dwarf Companion? *James F. Dominy and David L. Lambert.* **270**, 180, 78-G11 (1983)
- Heavy-Element Abundances in the Classical Barium Star HR 774. *Jocelyn Tomkin and David L. Lambert.* **273**, 722, 121-D14 (1983)
- LAMONTAGNE, ROBERT. A Spectroscopic Study of Four Late-Type Galactic WN Stars: The Question of Duplicity. *Robert Lamontagne, Anthony F. J. Moffat, and Wilhelm Seggewiss.* **269**, 596, 73-A1 (1983)
- LANDAU, R. Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. *R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek.* **268**, 68, 52-F3 (1983)
- LANDECKER, P. B. Acceleration and Confinement of Energetic Particles in the 1980 June 7 Solar Flare. *S. R. Kane, K. Kai, T. Kosugi, S. Enome, P. B. Landecker, and D. L. McKenzie.* **271**, 376, 92-A14 (1983)

- LANDINI, MASSIMO. Far-Ultraviolet Diffuse Emission Lines from the Interstellar Medium. *Francesco Paresce, Brunella C. Monsignori Fossi, and Massimo Landini*. **266**, L107, 39-C7 (1983)
- LANDMAN, DONALD A. Some Spectral Plasma Diagnostics for Prominences and Structures in the Middle Chromosphere. *Donald A. Landman*. **269**, 728, 74-D11 (1983)
- Physical Conditions in the Cool Parts of Prominences. *Donald A. Landman*. **270**, 265, 79-G2 (1983)
- LANDSTREET, J. D. The Magnetic Fields of the Helium-weak B Stars. *Ermanno F. Borra, J. D. Landstreet, and Ian Thompson*. **53**, 151, 18-D13 (1983) (Abstr. in **271**, 894, 99-C2)
- LANDSTREET, JOHN D. A Proposed New White Dwarf Spectral Classification System. *Edward M. Sion, Jesse L. Greenstein, John D. Landstreet, James Liebert, Harry L. Shipman, and Gary A. Wegner*. **269**, 253, 68-A1 (1983)
- LANE, ADAIR P. Detection of  $J = 5-4$  SiO Masers in Late-Type Stars. *Dan P. Clemens and Adair P. Lane*. **266**, L117, 39-D5 (1983)
- LANG, F. High-Energy X-Ray Observations of Vela X-1. *M. Bautz, S. Howe, A. Gorecki, F. Lang, A. Levine, F. Primini, and W. H. G. Lewin*. **266**, 794, 37-A8 (1983)
- LANG, F. L. HEAO 1 High-Energy X-Ray Observations of Centaurus X-3. *S. K. Howe, F. A. Primini, M. W. Bautz, F. L. Lang, A. M. Levine, and W. H. G. Lewin*. **272**, 678, 109-B12 (1983)
- LANG, KENNETH R. Very Large Array Observations of Solar Active Regions. III. Multiple Wavelength Observations. *Kenneth R. Lang, Robert F. Willson, and Victor Gaizauskas*. **267**, 455, 44-F12 (1983)
- Bright, Rapid, Highly Polarized Radio Spikes from the M Dwarf AD Leonis. *Kenneth R. Lang, Jay Bookbinder, Leon Golub, and Michael M. Davis*. **272**, L15, 105-E8 (1983)
- LANGER, G. E. Carbon and Nitrogen Abundances in Giant Stars of the Metal-poor Globular Cluster M15. *Charles F. Trefzger, Duane F. Carbon, G. E. Langer, Nicholas B. Suntzeff, and Robert P. Kraft*. **266**, 144, 28-E6 (1983)
- LANGER, WILLIAM D. Detection of  $\text{H}^{13}\text{N}^+$  and  $\text{HN}^{13}\text{N}^+$  in Interstellar Clouds. *Richard A. Linke, Michel Guélin, and William D. Langer*. **271**, L85, 100-C12 (1983)
- Curves for Analysis of the Two Lowest Rotational Transitions of Carbon Monoxide Using the Large Velocity Gradient Radiative Transfer Model. *Paul F. Goldsmith, Judith S. Young, and William D. Langer*. **51**, 203, 4-C1 (1983) (Abstr. in **264**, 748, 10-D12)
- LANGHOFF, S. R. The  $\text{C}_2\text{H}$ ,  $\text{C}_2$ , and CN Electronic Absorption Bands in the Carbon Star HD 19557. *J. H. Goebel, J. D. Bregman, D. M. Cooper, D. Goorvitch, S. R. Langhoff, and F. C. Witteborn*. **270**, 190, 79-A7 (1983)
- LANNING, HOWARD. Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Baliunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning*. **275**, 752, 145-F7 (1983)
- LAROSA, T. N. Radiatively Induced Star Formation. *T. N. LaRosa*. **274**, 815, 134-C5 (1983)
- LARSON, HAROLD P. The  $\text{NH}_3$  Spectrum in Saturn's 5 Micron Window. *Uwe Fink, Harold P. Larson, Gordon L. Bjoraker, and James R. Johnson*. **268**, 880, 62-F5 (1983)
- The 0.9-2.5 Micron Spectrum of Comet West 1976 VI. *James R. Johnson, Uwe Fink, and Harold P. Larson*. **270**, 769, 86-D10 (1983)
- LARSSON, MATS. A Theoretical Investigation of the Radiative Properties of the CN Red and Violet Systems. *Mats Larsson, Per E. M. Siegbahn, and Hans Ågren*. **272**, 369, 105-A10 (1983)
- LATHAM, DAVID. A Survey of Galaxy Redshifts. IV. The Data. *John Huchra, Marc Davis, David Latham, and John Tonry*. **52**, 39, 10-D11 (1983) (Abstr. in **268**, 906, 63-A9)
- LATHAM, DAVID W. High-Resolution Spectroscopy of Selected Absorption Lines toward Quasi-stellar Objects. I. Lyman-Alpha toward PHL 957. *Frederic H. Chaffee, Jr., Ray J. Weymann, David W. Latham, and Peter A. Strittmatter*. **267**, 12, 40-B3 (1983)
- LATTIMER, JAMES M. The Effect of Trapped Lepton Number and Entropy on the Outcome of Stellar Collapse. *Adam Burrows and James M. Lattimer*. **270**, 735, 86-B3 (1983)
- LAVERY, RUSSELL J. X-Ray, Optical, and Radio Observations of the Blue Galaxy Butcher-Oemler 6 in the 3C 295 Cluster. *J. Patrick Henry, John T. Clarke, Stuart Bowyer, and Russell J. Lavery*. **272**, 434, 106-D14 (1983)
- LAWRENCE, A., et al. X-Ray, Radio, and Infrared Observations of the "Rapid Burster" (MXB 1730-335) during 1979 and 1980. *A. Lawrence, L. Cominsky, W. H. G. Lewin, M. Oda, Y. Ogawara, H. Inoue, K. Koyama, K. Makishima, M. Matsumoto, T. Murakama, T. Ohashi, N. Shibasaki, Y. Tanaka, I. Kondo, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, T. Dashido, R. Oka, T. Ohkawa, T. Maruyama, T. Yokoyama, G. Nicholson, T. Balonek, W. A. Dent, I. S. Glass, B. S. Carter, A. W. Jones, M. J. Selby, C. Martinez Roger, C. Sanchez Magro, A. B. Giles, M. Duldig, A. Pramesh Rao, V. R. Venugopal, F. R. Haynes, D. L. Jauncey, H. Okuda, S. Sato, Y. Kobayashi, J. Jugaka, D. Backman, R. Pogge, P. E. Hodge, H. D. Aller, and J. van Paradijs*. **267**, 301, 43-B10 (1983)
- LAWRENCE, A. Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. *A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsumoto, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs*. **271**, 793, 98-B8 (1983)
- LAWRENCE, C. R. 5 GHz Observations of Sources in the Arecibo 611 MHz Survey. *C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke*. **51**, 67, 2-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- 5 GHz Observations of Sources in the Arecibo 611 MHz Survey: Erratum. *C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke*. **52**, 182, 11-G4 (1983) (Orig. paper in **51**, 67, 2-A1)
- LAWRIE, DAVID G. Velocity Dispersion of Planetary Nebulae in the Nuclear Bulge of M31. *David G. Lawrie*. **273**, 562, 119-F8 (1983)
- LAYZER, DAVID. Normal Modes of Relaxation in Stellar Systems: Dynamical Friction and Thermalization. *David Layzer*. **266**, 831, 37-D8 (1983)
- LEA, SUSAN M. Accretion onto Magnetized Neutron Stars: X-Ray Pulsars with Intermediate Rotation Rates. *David J. Burnard, Susan M. Lea, and Jonathan Arons*. **266**, 175, 28-G10 (1983)
- LEACH, JOHN. The Impulsive Phase of Solar Flares. II. Characteristics of the Hard X-Rays. *John Leach and Vahé Petrosian*. **269**, 715, 74-C12 (1983)
- LEACOCK, R. J. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B.*

- C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea. **274**, 101, 125-A9 (1983)
- LEAHY, D. X-Ray Observations of 4U 1626-67 by the Monitor Counter on the Einstein (HEAO 2) Observatory. R. F. Elsner, W. Darbro, D. Leahy, M. C. Weisskopf, P. G. Sutherland, S. M. Kahn, and J. E. Grindlay. **266**, 769, 36-F6 (1983)
- The Period History of the X-Ray Pulsar in MSH 15-52. M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Narayan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward. **267**, 711, 48-E5 (1983)
- LEAHY, D. A. On Searches for Pulsed Emission with Application to Four Globular Cluster X-Ray Sources: NGC 1851, 6441, 6624, and 6712. D. A. Leahy, W. Darbro, R. F. Elsner, M. C. Weisskopf, P. G. Sutherland, S. Kahn, and J. E. Grindlay. **266**, 160, 28-F9 (1983)
- On Searches for Periodic Pulsed Emission: The Rayleigh Test Compared to Epoch Folding. D. A. Leahy, R. F. Elsner, and M. C. Weisskopf. **272**, 256, 103-F14 (1983)
- LEBOFSKY, M. J. An Infrared and Optical Investigation of Galactic Nuclei with Compact Radio Sources. T. M. Heckman, M. J. Lebofsky, G. H. Rieke, and W. van Breugel. **272**, 400, 106-B8 (1983)
- LEBOVITZ, N. R. On the Fission Theory of Binary Stars. III. The Formulation of the Bifurcation Problem. N. R. Lebovitz. **275**, 316, 140-D10 (1983)
- LEBRUN, F. Gamma-Ray Astronomy and the Local Interstellar Medium. F. Lebrun and J. A. Paul. **266**, 276, 30-A1 (1983)
- Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gotwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills. **274**, 231, 126-C13 (1983)
- LECAR, MYRON. Can Secondary Infall Produce Flat Rotation Curves? Carlton Pryor and Myron Lecar. **269**, 513, 72-A14 (1983)
- LEDDEEN, J. E. A Search for X-Ray Emission from Optically Quiet, Compact Radio Sources. J. E. Ledden and S. L. O'Dell. **270**, 434, 83-A1 (1983)
- LEE, T. J. Detection of CH<sub>3</sub>OH J = 5-4 Lines around 242 GHz from OMC-1. W. Boland, Th. de Graauw, S. Lindholm, and T. J. Lee. **271**, 183, 90-A4 (1983)
- LEPP, E. MYCKKY. The Spectra of Wolf-Rayet Stars. I. Optical Line Strengths and the Hydrogen-to-Helium Ratios in WN Type Stars. Peter S. Conti, E. Myckky Lepp, and Douglas N. Perry. **268**, 228, 54-D9 (1983)
- LEER, EGIL. Alfvén Waves in Stellar Winds. Thomas E. Holzer, Tor Flå, and Egil Leer. **275**, 808, 146-D3 (1983)
- LEIBACHER, J. Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner. **270**, 79-G7 (1983)
- LEIBACHER, J. W. Inner-Shell Transitions in Fe XIX-XXII in the X-Ray Spectra of Solar Flares and Tokamaks. K. J. H. Phillips, J. R. Lemen, R. D. Cowan, G. A. Doschek, and J. W. Leibacher. **265**, 1120, 25-A10 (1983)
- X-Ray Line Ratios from Helium-like Ions: Updated Theory and SMM Flare Observations. C. J. Wolfson, J. G. Doyle, J. W. Leibacher, and K. J. H. Phillips. **269**, 319, 68-F2 (1983)
- LEIBOWITZ, ELIA M. SS 433: Improved Evidence for a Persistent 160 Day Photometric Period. Gary D. Henson, James C. Kemp, Mark S. Barbour, Daniel J. Kraus, Elia M. Leibowitz, and Tsevi Mazeh. **275**, 247, 139-F10 (1983)
- LEININGER, DOUGLAS. Stellar Images Derived from Rotation Broadening: AW Ursae Majoris. Lawrence Anderson, Darryl Stanford, and Douglas Leininger. **270**, 200, 79-B3 (1983)
- LEMEN, J. R. Inner-Shell Transitions in Fe XIX-XXII in the X-Ray Spectra of Solar Flares and Tokamaks. K. J. H. Phillips, J. R. Lemen, R. D. Cowan, G. A. Doschek, and J. W. Leibacher. **265**, 1120, 25-A10 (1983)
- LEPP, STEPHEN. X-Ray Sources in Molecular Clouds. Stephen Lepp and Richard McCray. **269**, 560, 72-E7 (1983)
- The Kinetic Theory of H<sub>2</sub> Dissociation. Stephen Lepp and J. Michael Shull. **270**, 578, 84-D9 (1983)
- LESTER, D. F. Observations of NGC 7027 from 5.2 to 7.5 Microns: The Detection of Ni II and Additional Dust Features. J. D. Bregman, H. L. Dinerstein, J. H. Goebel, D. F. Lester, F. C. Witteborn, and D. M. Rank. **274**, 666, 132-F7 (1983)
- LESTER, DANIEL F. A Far-Infrared Study of the N/O Abundance Ratio in Galactic H II Regions. Daniel F. Lester, Harriet L. Dinerstein, Michael W. Werner, Dan M. Watson, and Reinhard L. Genzel. **271**, 618, 96-C6 (1983)
- An Ionization Gradient across the Front of M17 SW. Daniel F. Lester, Harriet L. Dinerstein, David M. Rank, and Diane H. Wooden. **275**, 130, 138-D13 (1983)
- LETAW, JOHN R. Proton-Nucleus Total Inelastic Cross Sections: An Empirical Formula for  $E > 10$  MeV. John R. Letaw, R. Silberberg, and C. H. Tsao. **51**, 271, 6-A2 (1983) (Abstr. in **265**, 1136, 25-B12)
- LEUNG, KAM-CHING. Spectroscopic and Photometric Analysis of the WN7 Eclipsing Binary CQ Cephei. Kam-Ching Leung, Anthony F. J. Moffat, and Wilhelm Seggewiss. **265**, 961, 23-C9 (1983)
- LEVAN, P. D. Near-Infrared Spectrophotometry of Planetary Nebulae. P. D. LeVan and Richard J. Rudy. **272**, 137, 102-E4 (1983)
- LEVENTHAL, MARVIN. High-Velocity Iron Absorption Lines in Supernova Remnant 1006. Chi-Chao Wu, Marvin Leventhal, Craig L. Sarazin, and Theodore R. Gull. **269**, L5, 69-A7 (1983)
- LEVINE, A. Discovery of 13.5 s X-Ray Pulsations from LMC X-4 and an Orbital Determination. R. L. Kelley, J. G. Jernigan, A. Levine, L. D. Petro, and S. Rappaport. **264**, 568, 8-D13 (1983)
- High-Energy X-Ray Observations of Vela X-1. M. Bautz, S. Howe, A. Gorecki, F. Lang, A. Levine, F. Primini, and W. H. G. Lewin. **266**, 794, 37-A8 (1983)
- LEVINE, A. M. HEAO 1 High-Energy X-Ray Observations of Centaurus X-3. S. K. Howe, F. A. Primini, M. W. Bautz, F. L. Lang, A. M. Levine, and W. H. G. Lewin. **272**, 678, 109-B12 (1983)
- LEVREAULT, RUSSELL M. Interactions between Pre-Main-Sequence Objects and Molecular Clouds. I. Elias 1-12. Russell M. Levreault. **265**, 855, 22-B4 (1983)
- LEWIN, W. H. G. see also LAWRENCE, A., et al.
- LEWIN, W. H. G. High-Energy X-Ray Observations of Vela X-1. M. Bautz, S. Howe, A. Gorecki, F. Lang, A. Levine, F. Primini, and W. H. G. Lewin. **266**, 794, 37-A8 (1983)
- X-Ray Burst Observations of Serpens X-1. M. Sztajno, E. M. Basinska, L. R. Cominsky, F. J. Marshall, and W. H. G. Lewin. **267**, 713, 48-E7 (1983)
- Irregular X-Ray Variability in the Transient X-Ray Burst Source MXB 1659-29. L. Cominsky, W. Ossman, and W. H. G. Lewin. **270**, 226, 79-D1 (1983)
- Optical Candidates for the 1978 November 19 Gamma-Ray Burst Source. H. Pedersen, C. Motch, M. Tarengi, J. Danziger, G. Pizzichini, and W. H. G. Lewin. **270**, L43, 87-A14 (1983)
- Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsuoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs. **271**, 793, 98-B8 (1983)
- HEAO 1 High-Energy X-Ray Observations of Centaurus X-3. S. K. Howe, F. A. Primini, M. W. Bautz, F. L. Lang, A. M. Levine, and W. H. G. Lewin. **272**, 678, 109-B12 (1983)
- LI, TI-PEI. Analysis Methods for Results in Gamma-Ray As-



- tronomy. *Ti-pei Li and Yu-qian Ma*. **272**, 317, 104-D6 (1983)
- LIANG, E. P. On the Nature of Two Gamma Bursts with Spectral Evolutions Observed by the KONUS Experiment. *E. P. Liang*. **268**, L89, 63-F5 (1983)
- Analysis of the Konus Catalog of Gamma-Ray Bursts with the Thermal Synchrotron Model. *E. P. Liang, T. E. Jernigan, and R. Rodrigues*. **271**, 766, 97-G5 (1983)
- LICHTEN, STEPHEN M. Warm H I Halos around Molecular Clouds. *Peter G. Wannier, Stephen M. Lichten, and Mark Morris*. **268**, 727, 61-B5 (1983)
- LIEBERT, J. The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Macacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger*. **266**, L73, 39-A4 (1983)
- The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. *John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Macacaro, I. J. Danziger, D. Kunth, and J. Lub*. **273**, 458, 118-D12 (1983)
- LIEBERT, JAMES. Two Hot, Low-Field Magnetic DA White Dwarfs. *James Liebert, Gary D. Schmidt, Richard F. Green, H. S. Stockman, and John T. McGraw*. **264**, 262, 3-F7 (1983)
- A Proposed New White Dwarf Spectral Classification System. *Edward M. Sion, Jesse L. Greenstein, John D. Landstreet, James Liebert, Harry L. Shipman, and Gary A. Wegner*. **269**, 253, 68-A1 (1983)
- The Peculiar Cool White Dwarf LHS 1126: A Different Interpretation. *James Liebert and Conard C. Dahn*. **269**, 258, 68-A7 (1983)
- G74-7: A True DA, F (DAZ) White Dwarf. *P. Lacombe, James Liebert, F. Wesemael, and G. Fontaine*. **272**, 660, 109-A8 (1983)
- LHS 2924: A Uniquely Cool Low-Luminosity Star with a Peculiar Energy Distribution. *Ronald G. Probst and James Liebert*. **274**, 245, 126-D13 (1983)
- LIEBERT, JAMES W. The Most Luminous Quasar: S5 0014+81. *Helmut Kühr, James W. Liebert, Peter A. Strittmatter, Gary D. Schmidt, and Craig Mackay*. **275**, L33, 148-B1 (1983)
- LIGGETT, MARGARET. He D<sub>3</sub> as a Diagnostic for the Hard and Soft X-Rays from Solar Flares. *Uri Feldman, Margaret Liggett, and Harold Zirin*. **271**, 832, 98-E5 (1983)
- LIGHTMAN, ALAN P. Relativistic Thermal Plasmas: Effects of Magnetic Fields. *Suguru Araki and Alan P. Lightman*. **269**, 49, 65-E2 (1983)
- LILLER, WILLIAM. A Search for Globular Clusters around the Edge-on Spiral Galaxy NGC 55. *William Liller and Gonzalo Alcaïno*. **264**, 53, 1-E2 (1983)
- A Search for Globular Clusters around the Edge-on Late-Type Spiral Galaxy NGC 253. *William Liller and Gonzalo Alcaïno*. **265**, 166, 13-G9 (1983)
- LIN, D. N. C. Numerical Simulations of the Decay of Satellite Galaxy Orbits. *D. N. C. Lin and Scott Tremaine*. **264**, 364, 6-C9 (1983)
- Is There Nonluminous Matter in Dwarf Spheroidal Galaxies? *S. M. Faber and D. N. C. Lin*. **266**, L17, 32-B3 (1983)
- Some Implications of Nonluminous Matter in Dwarf Spheroidal Galaxies. *D. N. C. Lin and S. M. Faber*. **266**, L21, 32-B7 (1983)
- The Astrometric Position of T Tauri and the Nature of Its Companion. *Robert B. Hanson, B. F. Jones, and D. N. C. Lin*. **270**, L27, 81-B13 (1983)
- LIN, R. P. First-Order Fermi Acceleration in Solar Flares as a Mechanism for the Second-Step Acceleration of Prompt Protons and Relativistic Electrons. *T. Bai, H. S. Hudson, R. M. Pelling, R. P. Lin, R. A. Schwartz, and T. T. von Rosenvinge*. **267**, 433, 44-E3 (1983)
- LIND, K. R. VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young*. **272**, 383, 106-A5 (1983)
- LINDBLOM, LEE. On the Stability of Rotating Stellar Models in General Relativity Theory. *Lee Lindblom and William A. Hiscock*. **267**, 384, 44-A10 (1983)
- Necessary Conditions for the Stability of Rotating Newtonian Stellar Models. *Lee Lindblom*. **267**, 402, 44-B14 (1983)
- The Quadrupole Oscillations of Neutron Stars. *Lee Lindblom and Steven L. Detweiler*. **53**, 73, 17-F7 (1983) (Abstr. in **271**, 891, 99-B13)
- The Radial Oscillations of Neutron Stars. *Edward N. Glass and Lee Lindblom*. **53**, 93, 17-G13 (1983) (Abstr. in **271**, 892, 99-B14)
- LINDHOLM, S. Detection of CH<sub>3</sub>OH J = 5-4 Lines around 242 GHz from OMC-1. *W. Boland, Th. de Graauw, S. Lindholm, and T. J. Lee*. **271**, 183, 90-A4 (1983)
- LINDSEY, C. Submillimeter Extensions of the Solar Limb Determined from Observations of the Total Eclipse of 1982 July 31. *C. Lindsey, E. E. Becklin, J. T. Jefferies, F. Q. Orrall, M. W. Werner, and Ian Gatley*. **264**, L25, 5-B9 (1983)
- LINFIELD, R. P. Rectilinear Motions in 3C 345. *M. H. Cohen, S. C. Unwin, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **269**, L1, 69-A3 (1983)
- Superluminal Motion in the Quasar 3C 345. *S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **271**, 536, 95-C13 (1983)
- LINFIELD, ROGER. VLBI Observations of the QSO 4C 49.22. *Roger Linfield*. **275**, 461, 142-E6 (1983)
- LING, J. C. The State of Cygnus X-1. *J. C. Ling, W. A. Mahoney, W. A. Wharton, A. S. Jacobson, and L. Kaluzienski*. **275**, 307, 140-D1 (1983)
- LINGENFELTER, R. E. Implications of High-Energy Neutron Observations from Solar Flares. *R. Ramaty, R. J. Murphy, B. Kozlovsky, and R. E. Lingenfelter*. **273**, L41, 117-D12 (1983)
- LINKE, R. A. The Kinetic Temperature and Density of the Sagittarius Molecular B2 Cloud from Observations of Methyl Cyanide. *Sally E. Cummins, Sheldon Green, P. Thaddeus, and R. A. Linke*. **266**, 331, 30-E4 (1983)
- LINKE, RICHARD A. Dense Cores in Dark Clouds. I. CO Observations and Column Densities of High-Extinction Regions. *P. C. Myers, Richard A. Linke, and P. J. Benson*. **264**, 517, 8-A1 (1983)
- Detection of H<sup>13</sup>NN<sup>+</sup> and HN<sup>13</sup>N<sup>+</sup> in Interstellar Clouds. *Richard A. Linke, Michel Guélin, and William D. Langer*. **271**, L85, 100-C12 (1983)
- LINSKY, J. L. The Formation of Emission Lines in the Expanding Chromospheres of Luminous Cool Stars. I. The Importance of Atmospheric Extension and Partial Redistribution Effects. *S. A. Drake and J. L. Linsky*. **273**, 299, 115-E1 (1983)
- First Detection of Winds in Red Giants by Microwave Continuum Techniques. *S. A. Drake and J. L. Linsky*. **274**, L77, 136-C3 (1983)
- LINSKY, JEFFREY L. Coordinated Einstein and IUE Observations of a Disparitions Brusques Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haich, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana*. **267**, 280, 43-A1 (1983)
- The Narrow Ultraviolet Emission Lines of the Red Dwarf AU Microscopii (dM1.6e). *Thomas R. Ayres, Kjell Eriksson, Jeffrey L. Linsky, and R. E. Stencel*. **270**, L17, 80-B4 (1983)
- Outer Atmospheres of Cool Stars. XIII. Capella at Critical Phases. *Thomas R. Ayres, Francis H. Schiffer III, and Jeffrey L. Linsky*. **272**, 223, 103-D9 (1983)
- Outer Atmospheres of Cool Stars. XIV. A Model for the Chromosphere and Transition Region of Beta Ceti (G9.5 III). *Kjell Eriksson, Jeffrey L. Linsky, and Theodore Simon*. **272**, 665, 109-A13 (1983)
- Microwave Emission from the Coronae of Late-Type Dwarf

- Stars. *Jeffrey L. Linsky and Dale E. Gary*. **274**, 776, 133-G5 (1983)
- Outer Atmospheres of Cool Stars. XV. High-Dispersion Ultraviolet Studies of Active Chromosphere G-K Dwarfs. *Thomas R. Ayres, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, and Alexander Brown*. **274**, 784, 134-A1 (1983)
- Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold*. **274**, 801, 134-B5 (1983)
- LISZT, HARVEY S. H I Clouds, H I Spin Temperatures. *Harvey S. Liszt*. **275**, 163, 138-G6 (1983)
- LITTLETON, J. E. Partition Functions and Dissociation Constraints for Zirconium Oxide. *A. Shankar and J. E. Littleton*. **274**, 916, 135-D11 (1983)
- LIVSHITS, M. A Thermal Model of Sunspot Influence on Solar Luminosity. *P. Foukal, L. A. Fowler, and M. Livshits*. **267**, 863, 50-B13 (1983)
- LO, K. Y. The H I Distribution in an Extremely Faint Dwarf Irregular Galaxy M81 dWA. *W. L. W. Sargent, R. Sancisi, and K. Y. Lo*. **265**, 711, 20-D14 (1983)
- LOCKMAN, FELIX J. An Energetic, Bisymmetrically Expanding H I Remnant. *Felix J. Lockman and B. L. Gantzel*. **268**, 117, 53-B11 (1983)
- LOCKWOOD, G. W. The Albedo of Uranus. *G. W. Lockwood, B. L. Lutz, D. T. Thompson, and A. Warnock III*. **266**, 402, 31-C6 (1983)
- LOEWENSTEIN, MICHAEL. Copernicus Observations of C I: Pressures and Carbon Abundances in Diffuse Interstellar Clouds. *Edward B. Jenkins, Michael Jura, and Michael Loewenstein*. **270**, 88, 78-A1 (1983)
- LOEWENSTEIN, R. F. Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith*. **274**, 571, 131-E1 (1983)
- Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. *Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic*. **274**, L43, 129-D3 (1983)
- LONDON, RICHARD A. Spherical Accretion onto Quasars. *Julian H. Krolik and Richard A. London*. **267**, 18, 40-B9 (1983)
- Optical Radiation Associated with Gamma-Ray Bursts. *Richard A. London and Lynn R. Cominsky*. **275**, L59, 148-C14 (1983)
- LONG, K. S. Supernova Remnants in the Magellanic Clouds. *D. S. Mathewson, V. L. Ford, M. A. Dopita, I. R. Tuohy, K. S. Long, and David J. Helfand*. **51**, 345, 7-F1 (1983) (Abstr. in **266**, 902, 38-B11)
- LONG, KNOX S. The X-Ray Surface Brightness of Kepler's Supernova Remnant. *Richard L. White and Knox S. Long*. **264**, 196, 3-A10 (1983)
- LOREN, ROBERT B. J = 2-1 CO Observations of Molecular Clouds with High-Velocity Gas: Evidence for Clumpy Outflows. *Richard L. Plambeck, Ronald L. Snell, and Robert B. Loren*. **266**, 321, 30-D8 (1983)
- Molecular Clouds on the Threshold of Star Formation: The Radial Density Profile of the Cores of the Rho Ophiuchi and R Coronae Australis Clouds. *Robert B. Loren, Aa. Sandkvist, and A. Wootten*. **270**, 620, 84-G9 (1983)
- Cyanoacetylene as a Density Probe of Molecular Clouds. *Paul A. Vanden Bout, Robert B. Loren, Ronald L. Snell, and Alwyn Wootten*. **271**, 161, 89-F7 (1983)
- LORENZETTI, D. The Near-Infrared Spectrum of the Herbig Ae-Be Stars. *D. Lorenzetti, P. Saraceno, and F. Strafella*. **264**, 554, 8-C13 (1983)
- LOUGHHEAD, R. E. High-Resolution Photography of the Solar Chromosphere. XVII. Geometry of Ha Flare Loops Observed on the Disk. *R. E. Loughhead, Jia-Long Wang, and G. Blows*. **274**, 883, 135-A9 (1983)
- LOVAS, F. J. Methanol in Orion A: Simultaneous Observations of Corresponding Rotational Transitions in the Ground and Torsionally Excited States. *J. M. Hollis, F. J. Lovas, R. D. Suenram, P. R. Jewell, and L. E. Snyder*. **264**, 543, 8-C2 (1983)
- Laboratory Measurement of the  $4_{u-3_{l}}$  70 GHz Transition of Ground-State Methylene ( $\text{CH}_2$ ). *F. J. Lovas, R. D. Suenram, and K. M. Evenson*. **267**, L131, 51-E5 (1983)
- An Extensive Galactic Search for Conformer II Glycine. *L. E. Snyder, J. M. Hollis, R. D. Suenram, F. J. Lovas, L. W. Brown, and D. Buhl*. **268**, 123, 53-C3 (1983)
- LOW, F. J. Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low*. **273**, 58, 112-F10 (1983)
- Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. *Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic*. **274**, L43, 129-D3 (1983)
- LOWE, R. M. A Redetermination of the Solar Abundance of Molybdenum. *E. Biémont, N. Grevesse, P. Hannaford, R. M. Lowe, and W. Whaling*. **275**, 889, 147-C4 (1983)
- LÜ, P. K. A Catalog of Spectral Classification and Photometry of Barium Stars. *P. K. Lü, D. W. Dawson, A. R. Uppgren, and E. W. Weis*. **52**, 169, 11-E11 (1983) (Abstr. in **268**, 905, 63-A8)
- LUB, J. The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. *John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Maccacaro, I. J. Danziger, D. Kunth, and J. Lub*. **273**, 458, 118-D12 (1983)
- LUB, JAN. The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin*. **269**, 375, 70-E2 (1983)
- LUBIN, P. Linear and Circular Polarization of the Cosmic Background Radiation. *P. Lubin, P. Melese, and G. Smoot*. **273**, L51, 123-A4 (1983)
- LUCK, R. EARLE. Nickel Overabundances in Extremely Metal-deficient Red Giants. *R. Earle Luck and Howard E. Bond*. **271**, L75, 100-C3 (1983)
- LUCY, L. B. The Distribution of Molecular Clouds in the Nuclear Region of NGC 1068. *N. Z. Scoville, Judith S. Young, and L. B. Lucy*. **270**, 443, 83-A10 (1983)
- The Formation of Resonance Lines in Locally Nonmonotonic Winds. II. An Amplitude Diagnostic. *L. B. Lucy*. **274**, 372, 127-G3 (1983)
- LUTZ, B. L. The Albedo of Uranus. *G. W. Lockwood, B. L. Lutz, D. T. Thompson, and A. Warnock III*. **266**, 402, 31-C6 (1983)
- LUTZ, BARRY L. Observations of Interstellar  $\text{C}_2$  toward Three Heavily Reddened Stars. *Barry L. Lutz and Richard M. Crutcher*. **271**, L101, 100-D12 (1983)
- Monodeuterated Methane in the Outer Solar System. I. Spectroscopic Analysis of the Bands at 1.55 and 1.95 Microns. *Barry L. Lutz, C. de Bergh, and J. P. Maillard*. **273**, 397, 116-E7 (1983)
- LYNDS, BEVERLY T. An Optical Study of IC 1470. *Beverly T. Lynds and Earl J. O'Neil, Jr.*. **265**, 803, 21-E1 (1983)
- Inhomogeneities in the Bubble Nebula, NGC 7635. *Beverly T. Lynds and Earl J. O'Neil, Jr.*. **274**, 650, 132-E1 (1983)
- MA, YU-QIAN. Analysis Methods for Results in Gamma-Ray Astronomy. *Ti-pei Li and Yu-qian Ma*. **272**, 317, 104-D6 (1983)
- MACALPINE, GORDON M. High-Velocity Absorbing Cloudlets as Potential Contributors to Observed Quasar Continua. *Ron-*

- ald G. Eastman, Gordon M. MacAlpine, and Douglas O. Richstone. **275**, 53, 137-E3 (1983)
- MACCACCARO, T. The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger.* **266**, L73, 39-A4 (1983)
- VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. *Isabella M. Gioia, E. D. Feigelson, T. Maccacaro, R. Schild, and G. Zamorani.* **271**, 524, 95-C1 (1983)
- The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. *John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Maccacaro, I. J. Danziger, D. Kunth, and J. Lub.* **273**, 458, 118-D12 (1983)
- MACCACCARO, TOMMASO. The X-Ray Spectra of the BL Lacertae Objects PKS 0548-322 and 3C 66A. *Dario Maccagni, Tommaso Maccacaro, and Massimo Tarengi.* **273**, 70, 112-G8 (1983)
- MACCAGNI, D. X-Ray and UV Observations of the BL Lacertae Object 3C 66A. *D. Maccagni, L. Maraschi, E. G. Tanzi, M. Tarengi, and L. Chiappetti.* **273**, 75, 113-A1 (1983)
- MACCAGNI, DARIO. The X-Ray Spectra of the BL Lacertae Objects PKS 0548-322 and 3C 66A. *Dario Maccagni, Tommaso Maccacaro, and Massimo Tarengi.* **273**, 70, 112-G8 (1983)
- MACDONALD, JIM. CNO Abundances and the Strengths of Nova Outbursts and Hydrogen Flashes on Accreting White Dwarfs. *Jim MacDonald.* **267**, 732, 48-F14 (1983)
- Mixing by Shear Instabilities in Differentially Rotating Inhomogeneous Stars with Application to Accreting White Dwarf Models for Novae. *Jim MacDonald.* **273**, 289, 115-D5 (1983)
- MACFARLANE, J. J. Statistical Mechanics of Light Elements at High Pressure. V. Three-dimensional Thomas-Fermi-Dirac Theory. *J. J. MacFarlane and W. B. Hubbard.* **272**, 301, 104-C3 (1983)
- MACGILLIVRAY, H. T. The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin.* **269**, 375, 70-E2 (1983)
- MACGREGOR, K. B. Mass Loss from Rotating Magnetic Stars: Weber and Davis Re-revisited. *K. B. MacGregor and V. J. Pizzo.* **267**, 340, 43-E8 (1983)
- MACHADO, M. Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. *J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado.* **265**, 1066, 24-D5 (1983)
- MACKAY, CRAIG. The Most Luminous Quasar: S5 0014+81. *Helmut Kühr, James W. Liebert, Peter A. Strittmatter, Gary D. Schmidt, and Craig Mackay.* **275**, L33, 148-B1 (1983)
- MACKAY, CRAIG D. Methane on Triton and Pluto: New CCD Spectra. *Jerome Apt, Nathaniel P. Carleton, and Craig D. Mackay.* **270**, 342, 80-E11 (1983)
- MACKLIN, R. L.  $^{187}\text{Os}(n, n')$  Inelastic Cross Section at 34 keV. *R. L. Macklin, R. R. Winters, N. W. Hill, and J. A. Harvey.* **274**, 408, 128-B11 (1983)
- MADEJSKI, GREG M. X-Ray Studies of BL Lacertae Objects with the Einstein Observatory: Confrontation with the Synchrotron Self-Compton Predictions. *Greg M. Madejski and Daniel A. Schwartz.* **275**, 467, 142-E12 (1983)
- MADORE, B. F. The Near-Infrared Cepheid Distance Scale. I. Preliminary Galactic Calibration. *R. McGonegal, C. W. McAlary, R. A. McLaren, and B. F. Madore.* **269**, 641, 73-D10 (1983)
- MADORE, BARRY F. Time Evolution of Disk Galaxies Undergoing Stochastic Self-propagating Star Formation. *Wendy L. Freedman and Barry F. Madore.* **265**, 140, 13-E11 (1983)
- The Distance to NGC 6822 from Infrared Photometry of Cepheids. *Christopher W. McAlary, Barry F. Madore, R. McGonegal, R. A. McLaren, and D. L. Welch.* **273**, 539, 119-D12 (1983)
- MAGUIRE, W. Measurements of Stratospheric Ethane in the Jovian South Polar Regions from Infrared Heterodyne Spectroscopy of the  $\nu_6$  Band near 12 Microns. *T. Kostiuik, M. J. Mumma, F. Espenak, D. Deming, D. E. Jennings, W. Maguire, and D. Zipoy.* **265**, 564, 18-B9 (1983)
- MAGUN, A. Observed Time Delays between Solar H $\alpha$  Flares and Microwave Bursts as Evidence for Various Energy Transport Mechanisms. *N. Kämpfer and A. Magun.* **274**, 910, 135-D5 (1983)
- MAHONEY, W. A. The State of Cygnus X-1. *J. C. Ling, W. A. Mahoney, W. A. Wheaton, A. S. Jacobson, and L. Kaluzienski.* **275**, 307, 140-D1 (1983)
- MAILLARD, J. P. Monodeuterated Methane in the Outer Solar System. I. Spectroscopic Analysis of the Bands at 1.55 and 1.95 Microns. *Barry L. Lutz, C. de Bergh, and J. P. Maillard.* **273**, 397, 116-E7 (1983)
- MAKINO, F. see also LAWRENCE, A., et al.
- MAKINO, F. Observations of Centaurus X-3 by Hakucho. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo.* **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo.* **267**, 310, 43-C6 (1983)
- MAKISHIMA, K. see also LAWRENCE, A., et al.
- MAKISHIMA, K. Observations of Centaurus X-3 by Hakucho. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo.* **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo.* **267**, 310, 43-C6 (1983)
- Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the Hinotori Satellite. *T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto.* **270**, L83, 87-D11 (1983)
- MALIN, D. F. Shell Structure in NGC 5128. *D. F. Malin, P. J. Quinn, and J. A. Graham.* **272**, L5, 105-D6 (1983)
- A Catalog of Elliptical Galaxies with Shells. *D. F. Malin and D. Carter.* **274**, 534, 131-A1 (1983)
- MALIN, DAVID F. The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin.* **269**, 375, 70-E2 (1983)
- MALKAN, MATTHEW A. The Reddening of Active Galactic Nuclei. *Matthew A. Malkan.* **264**, L1, 5-A2 (1983)
- IUE Observations of Markarian 3 and 6: Reddening and the Nonstellar Continuum. *Matthew A. Malkan and J. B. Oke.* **265**, 92, 13-B1 (1983)

- The Ultraviolet Excess of Luminous Quasars. II. Evidence for Massive Accretion Disks. *Matthew A. Malkan*. **268**, 582, 59-D4 (1983)
- The Stellar and Nonstellar Continua of Seyfert Galaxies: Non-thermal Emission in the Near-Infrared. *Matthew A. Malkan and Alexei V. Filippenko*. **275**, 477, 142-F8 (1983)
- MALUMUTH, ELIOT M. The Evolution of Clusters of Galaxies. I. Very Rich Clusters. *Douglas O. Richstone and Eliot M. Malumuth*. **268**, 30, 52-C7 (1983)
- MANCHESTER, R. N. The Central X-Ray Source in RCW 103: Evidence for Blackbody Emission. *I. R. Tuohy, G. P. Garmire, R. N. Manchester, and M. A. Dopita*. **268**, 778, 61-E14 (1983)
- Further Observations of the Long-Period Binary Pulsar PSR 0820+02. *R. N. Manchester, Lynette M. Newton, D. J. Cooke, P. R. Backus, M. Damashek, J. H. Taylor, and J. J. Condon*. **268**, 832, 62-B14 (1983)
- MANTOVANI, F. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wilts, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- MAO, X. SiO Isotopic Maser Emission from VY Canis Majoris. *S. Deguchi, J. Good, Y. Fan, X. Mao, D. Wang, and Nobuharu Ukita*. **264**, L65, 11-C8 (1983)
- MAO, XIN-JIE. Molecular Gas in the W33 Region. *Paul F. Goldsmith and Xin-Jie Mao*. **265**, 791, 21-D2 (1983)
- MARAN, S. P. Distribution of Forbidden Neutral Carbon Emission in the Ring Nebula (NGC 6720). *D. C. Jewitt, P. N. Kufnerman, G. E. Danielson, and S. P. Maran*. **268**, 683, 60-E13 (1983)
- MARASCHI, L. Ultraviolet Spectroscopy of V1341 Cygni (= Cygnus X-2). *L. Chiappetti, L. Maraschi, E. G. Tanzi, and A. Treves*. **265**, 354, 16-A5 (1983)
- X-Ray and UV Observations of the BL Lacertae Object 3C 66A. *D. Maccagni, L. Maraschi, E. G. Tanzi, M. Tarengi, and L. Chiappetti*. **273**, 75, 113-A1 (1983)
- MARCAIDE, J. M. Absence of Pulsar Ghost Remnants. *N. L. Cohen, W. D. Cotton, B. J. Geldzahler, and J. M. Marcaide*. **264**, 273, 3-G4 (1983)
- MARCAIDE, JON. Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? *José M. Torrelles, Luis F. Rodríguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho*. **274**, 214, 126-B10 (1983)
- MARCONI, M. L. The Atmosphere of a Dirty-Clastrite Cometary Nucleus: A Two-Phase, Multifluid Model. *M. L. Marconi and D. A. Mendis*. **273**, 381, 116-D5 (1983)
- MARCUS, PHILIP S. Multiscale Model Equations for Turbulent Convection and Convective Overshoot. *Philip S. Marcus, William H. Press, and Saul A. Teukolsky*. **267**, 795, 49-D12 (1983)
- MARDIROSIAN, F. General Properties of Algol Binaries. *G. Giuricin, F. Mardirossian, and M. Mezzetti*. **52**, 35, 9-E1 (1983) (Abstr. in **267**, 892, 50-D14)
- MARGON, BRUCE. Narrow-Band Photometric Periods in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi*. **269**, 605, 73-A11 (1983)
- Precession Instability in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi*. **273**, 697, 121-C2 (1983)
- A Second Cataclysmic Variable in a Globular Cluster. *Bruce Margon and Ronald A. Downes*. **274**, L31, 129-C6 (1983)
- MARISKA, J. T. Numerical Simulations of Loops Heated to Solar Flare Temperatures. I. Gasdynamics. *Chung-Chieh Cheng, E. S. Oran, G. A. Doschek, J. P. Boris, and J. T. Mariska*. **265**, 1090, 24-F4 (1983)
- Numerical Simulations of Loops Heated to Solar Flare Temperatures. II. X-Ray and UV Spectroscopy. *G. A. Doschek, Chung-Chieh Cheng, E. S. Oran, J. P. Boris, and J. T. Mariska*. **265**, 1103, 24-G3 (1983)
- MARISKA, JOHN T. Dynamics and Spectroscopy of Asymmetrical Heated Coronal Loops. *John T. Mariska and Jay P. Boris*. **267**, 404, 44-C7 (1983)
- MARKERT, T. H. High-Velocity, Asymmetric Doppler Shifts of the X-Ray Emission Lines of Cassiopeia A. *T. H. Markert, C. R. Canizares, G. W. Clark, and P. F. Winkler*. **268**, 134, 53-D12 (1983)
- MARKERT, THOMAS H. X-Ray Observations of M33 with the High Resolution Imager on the Einstein Observatory. *Thomas H. Markert and Andrew D. Rallis*. **275**, 571, 143-F14 (1983)
- MARSCH, E. Determination of the Solar Wind Angular Momentum Flux from the Helios Data—An Observational Test of the Weber and Davis Theory. *V. Pizzo, R. Schwenn, E. Marsch, H. Rosenbauer, K.-H. Mühlhäuser, and F. M. Neubauer*. **271**, 335, 91-E14 (1983)
- MARSCHER, ALAN P. Accurate Formula for the Self-Compton X-Ray Flux Density from a Uniform, Spherical, Compact Radio Source. *Alan P. Marscher*. **264**, 296, 4-B1 (1983)
- MARSH, K. A. Microwave and Hard X-Ray Imaging of a Solar Flare on 1980 November 5. *P. Hoyng, K. A. Marsh, H. Zirin, and B. R. Dennis*. **268**, 865, 62-E5 (1983)
- MARSHALL, F. E. A Two-Component X-Ray Spectrum from SMC X-1. *F. E. Marshall, N. E. White, and R. H. Becker*. **266**, 814, 37-C4 (1983)
- Stellar Contributions to the Hard X-Ray Galactic Ridge. *D. M. Worrall and F. E. Marshall*. **267**, 691, 48-C11 (1983)
- An X-Ray Survey of Nine Algol Systems. *N. E. White and F. E. Marshall*. **268**, L117, 64-A9 (1983)
- Rapid X-Ray Variability from the Seyfert 1 Galaxy NGC 4051. *F. E. Marshall, S. S. Holt, R. F. Mushotzky, and R. H. Becker*. **269**, L31, 76-A7 (1983)
- MARSHALL, F. J. Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibasaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo*. **267**, 310, 43-C6 (1983)
- X-Ray Burst Observations of Serpens X-1. *M. Sztajno, E. M. Basinska, L. R. Cominsky, F. J. Marshall, and W. H. G. Lewin*. **267**, 713, 48-E7 (1983)
- MARSHALL, H. L. Analysis of Complete Quasar Samples to Obtain Parameters of Luminosity and Evolution Functions. *H. L. Marshall, Y. Avni, H. Tananbaum, and G. Zamorani*. **269**, 35, 65-D2 (1983)
- Optical and X-Ray Observations of Faint Quasars in an Optically Selected Sample. *H. L. Marshall, H. Tananbaum, G. Zamorani, J. P. Huchra, A. Braccetti, and V. Zitelli*. **269**, 42, 65-D9 (1983)
- MARTIN, P. G. The Wavelength Dependence of Interstellar Polarization in the Large Magellanic Cloud. *Geoffrey C. Clayton, P. G. Martin, and Ian Thompson*. **265**, 194, 14-C3 (1983)
- The Polarization of Seyfert Galaxies. *P. G. Martin, I. B. Thompson, J. Maza, and J. R. P. Angel*. **266**, 470, 33-D10 (1983)
- The Circumstellar Dust of Mu Cephei. *C. Rogers, P. G. Martin, and Dennis R. Crabtree*. **272**, 175, 103-A1 (1983)
- MARTIN, ROBERT N. VLA Observations of Extragalactic NH<sub>3</sub> in IC 342. *Paul T. P. Ho and Robert N. Martin*. **272**, 484, 107-B3 (1983)
- MARTINEZ ROGER, C. see LAWRENCE, A., et al.
- MARUYAMA, T. see LAWRENCE, A., et al.
- MASAI, K. see also LAWRENCE, A., et al.
- MASAI, K. Observations of Centaurus X-3 by Hakucho. *T. Mu-*



- rakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo. **264**, 563, 8-D8 (1983)
- MASI, S. Search for Extragalactic Backgrounds in the Far-Infrared. C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera. **275**, L39, 148-B7 (1983)
- MASON, G. M. Temporal Variations of Nucleonic Abundances in Solar Flare Energetic Particle Events. I. Well-connected Events. G. M. Mason, G. Gloeckler, and D. Hovestadt. **267**, 844, 50-A8 (1983)
- MASON, K. O. Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. K. O. Mason, J. Middle-ditch, F. A. Córdova, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer. **264**, 575, 8-E6 (1983)
- HEAO A-2 Soft X-Ray Source Catalog. J. J. Nugent, K. A. Jensen, J. A. Nousek, G. P. Garmire, K. O. Mason, F. M. Walter, C. S. Bowyer, R. A. Stern, and G. R. Riegler. **51**, 1, 1-A2 (1983) (Abstr. in **263**, 1007, 142-F8)
- MASON, KEITH O. Time-resolved Ultraviolet and Optical Spectroscopy of the Pulsating X-Ray Source H2252-035. France A. Córdova, E. E. Fenimore, John Middle-ditch, and Keith O. Mason. **265**, 363, 16-B1 (1983)
- Time-resolved Spectrophotometry of the Emission Lines in the Galactic X-Ray Source H2252-035. John T. Clarke, Keith O. Mason, and Stuart Bowyer. **267**, 726, 48-F8 (1983)
- The Correlated X-Ray and Optical Time Variability of TT Arietis. K. A. Jensen, France A. Córdova, J. Middle-ditch, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer. **270**, 211, 79-B14 (1983)
- MASSA, DERCK. Peculiar Ultraviolet Interstellar Extinction. Derck Massa, Blair D. Savage, and Edward L. Fitzpatrick. **266**, 662, 35-D14 (1983)
- MASSEY, PHILIP. Wolf-Rayet Stars in the LMC: How Faint Are the Faintest? Philip Massey and Peter S. Conti. **264**, 126, 2-C8 (1983)
- Wolf-Rayet Stars in M33. Philip Massey and Peter S. Conti. **273**, 576, 119-G8 (1983)
- IUE Observations of the Exciting Stars of Giant H II Regions in M33: Supermassive Stars? Philip Massey and J. B. Hutchings. **275**, 578, 143-G9 (1983)
- MASSI, M. Infrared Line and Radio Continuum Emission of Circumstellar Ionized Regions. M. Simon, M. Felli, L. Cassar, J. Fischer, and M. Massi. **266**, 623, 35-B1 (1983)
- MASSON, C. Neutral Carbon in the Egg Nebula (AFGL 2688). C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wootten, C. Masson, and M. A. Frerking. **273**, 633, 120-D13 (1983)
- MASSON, C. R. The Distribution of the CO  $J = 2-1$  Emission from M82. E. C. Sutton, C. R. Masson, and T. G. Phillips. **275**, L49, 148-C2 (1983)
- MATESE, JOHN J. Conservative Mass Transfer in Close Binary Systems. I. Equations of Motion for Spin and Orbital Angular Momenta. John J. Matese and Daniel P. Whitmire. **266**, 776, 36-F13 (1983)
- MATHEWS, G. J. Neutron Capture Rates in the  $r$ -Process: The Role of Direct Radiative Capture. G. J. Mathews, A. Mengoni, F.-K. Thielemann, and William A. Fowler. **270**, 740, 86-B8 (1983)
- MATHEWS, GRANT J. A Comparison between Observed and Theoretical H-R Diagrams for the Young LMC Star Cluster NGC 1866. Stephen A. Becker and Grant J. Mathews. **270**, 155, 78-E12 (1983)
- MATHEWS, W. G. Stimulated Emission and the Flat Balmer Decrements of Cataclysmic Variable Stars. Moshe Elitzur, G. J. Ferland, W. G. Mathews, and G. A. Shields. **272**, L55, 111-B3 (1983)
- MATHEWS, WILLIAM G. Reverse Stellar Evolution, Stellar Ablation, and the Origin of Gas in Quasars. William G. Mathews. **272**, 390, 106-A12 (1983)
- MATHEWSON, D. S. Supernova Remnants in the Magellanic Clouds. D. S. Mathewson, V. L. Ford, M. A. Dopita, I. R. Tuohy, K. S. Long, and David J. Helfand. **51**, 345, 7-F1 (1983) (Abstr. in **266**, 902, 38-B11)
- MATHIEU, ROBERT D. Dynamical Constraints on Star Formation Efficiency. Robert D. Mathieu. **267**, L97, 51-C2 (1983)
- MATHIS, JOHN S. Nebular Dust and Extinction in Ionized Nebulae. I. The Balmer Decrement. John S. Mathis. **267**, 119, 41-C4 (1983)
- MATSAKIS, D. N. Small Rotating Clouds of Stellar Mass in Orion Molecular Cloud 1. Andrew Harris, C. H. Townes, D. N. Matsakis, and Patrick Palmer. **265**, L63, 26-C6 (1983)
- The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35$  c. B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Jostles, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming. **273**, L65, 123-B3 (1983)
- MATSUOKA, M. see also LAWRENCE, A., et al.
- MATSUOKA, M. Observations of Centaurus X-3 by Hakucho. T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsuoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs. **271**, 793, 98-B8 (1983)
- MATTESON, J. L. A Feature in the X-Ray Spectrum of Cygnus X-1: A Possible Positron Annihilation Line. P. L. Nolan and J. L. Matteson. **265**, 389, 16-C13 (1983)
- 2-165 keV Observations of Active Galaxies and the Diffuse Background. R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson. **269**, 423, 71-B2 (1983)
- MATTHEWS, H. E. The Detection of Butadiynyl ( $C_4H$ ) in Absorption against Cassiopeia A. M. B. Bell, P. A. Feldman, and H. E. Matthews. **273**, L35, 117-D7 (1983)
- MATTHEWS, HENRY E. SiS Maser Emission from IRC +10°216. Christian Henkel, Henry E. Matthews, and Mark Morris. **267**, 184, 42-A1 (1983)
- Detection of the  $J = 1-0$  Transition of  $CH_3CN$ . Henry E. Matthews and Trevor J. Sears. **267**, L53, 45-E13 (1983)
- The Detection of Vinyl Cyanide in TMC-1. Henry E. Matthews and Trevor J. Sears. **272**, 149, 102-F2 (1983)
- MATTHEWS, K. Infrared/Optical Energy Distributions of High-Redshift Quasars. B. T. Soifer, G. Neugebauer, J. B. Oke, K. Matthews, and J. H. Lacy. **265**, 18, 12-B12 (1983)
- Photometric Studies of Composite Stellar Systems. V. Infrared Photometry of Star Clusters in the Magellanic Clouds. S. E. Persson, M. Aaronson, Judith G. Cohen, Jay A. Frogel, and K. Matthews. **266**, 105, 28-B2 (1983)
- MATZ, S. M. Gamma-Ray Observational Constraints on the Origin of the Optical Continuum Emission from the White-Light Flare of 1980 July 1. J. M. Ryan, E. L. Chupp, D. J. Forrest, S. M. Matz, E. Rieger, C. Reppin, G. Kanbach,

- and G. H. Share. **272**, L61, 111-B8 (1983)
- MAXSON, C. W. *Einstein* Observations of X-Ray Emission from A Stars. L. Golub, F. R. Harnden, Jr., C. W. Maxson, R. Rosner, G. S. Vaiana, Webster Cash, Jr., and Theodore P. Snow, Jr. **271**, 264, 90-G11 (1983)
- MAYER-HASSELWANDER, H. A. Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Bucheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills. **274**, 231, 126-C13 (1983)
- MAZA, J. The Polarization of Seyfert Galaxies. P. G. Martin, J. B. Thompson, J. Maza, and J. R. P. Angel. **266**, 470, 33-D10 (1983)
- A Near-Infrared and Optical Study of X-Ray Selected Seyfert Galaxies. I. Observations. Christopher W. McAlary, R. A. McLaren, R. J. McGonegal, and J. Maza. **52**, 341, 15-A8 (1983) (Abstr. in **270**, 779, 86-E6)
- MAZEH, TSEVI. Kinematics of the Optical Filaments in W50. Tsevi Maze, Luis A. Aguilar, Richard R. Treffers, Arie K6nigl, and Linda S. Sparke. **265**, 235, 14-F5 (1983)
- SS 433: Improved Evidence for a Persistent 160 Day Photometric Period. Gary D. Henson, James C. Kemp, Mark S. Barbour, Daniel J. Kraus, Elia M. Leibowitz, and Tsevi Maze. **275**, 247, 139-F10 (1983)
- MALARY, C. W. The Near-Infrared Cepheid Distance Scale. I. Preliminary Galactic Calibration. R. McGonegal, C. W. McAlary, R. A. McLaren, and B. F. Madore. **269**, 641, 73-D10 (1983)
- MALARY, CHRISTOPHER W. The Distance to NGC 6822 from Infrared Photometry of Cepheids. Christopher W. McAlary, Barry F. Madore, R. McGonegal, R. A. McLaren, and D. L. Welch. **273**, 539, 119-D12 (1983)
- A Near-Infrared and Optical Study of X-Ray Selected Seyfert Galaxies. I. Observations. Christopher W. McAlary, R. A. McLaren, R. J. McGonegal, and J. Maza. **52**, 341, 15-A8 (1983) (Abstr. in **270**, 779, 86-E6)
- MALISTER, H. A. The Optical Variability and Spectrum of PKS 2155-304. H. R. Miller and H. A. Malister. **272**, 26, 101-C3 (1983)
- MALISTER, HAROLD A. Speckle Interferometric Measurements of Binary Stars. VIII. Harold A. Malister, Elaine M. Hendry, William I. Hartkopf, Belva G. Campbell, and Francis C. Fekel. **51**, 309, 6-F1 (1983) (Abstr. in **265**, 1135, 25-B11)
- Speckle Interferometric Measurements of Binary Stars. VIII. Harold A. Malister, Elaine M. Hendry, William I. Hartkopf, and Belva G. Campbell. **53**, 241, 19-D4 (1983) (Orig. paper in **51**, 309, 6-F1)
- MCCALL, MARSHALL L. The Type I Supernova 1981b in NGC 4536: The First 100 Days. David Branch, C. H. Lacy, Marshall L. McCall, P. G. Sutherland, A. Uomoto, J. C. Wheeler, and B. J. Wills. **270**, 123, 78-C9 (1983)
- MCCAMMON, D. The Soft X-Ray Diffuse Background. D. McCammon, D. N. Burrows, W. T. Sanders, and W. L. Kraushaar. **269**, 107, 66-B4 (1983)
- MCCAMMON, DAN. Interstellar Photoelectric Absorption Cross Sections, 0.03-10 keV. Robert Morrison and Dan McCammon. **270**, 119, 78-C4 (1983)
- MCCARTHY, D. D. The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\geq 0.35$  c. B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Jostes, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming. **273**, L65, 123-B3 (1983)
- MCCARTHY, J. F. Determinations of S III, O IV, and Ne V Abundances in Planetary Nebulae from Infrared Lines. M. A. Shure, T. Herter, J. R. Houck, D. A. Briotta, Jr., W. J. Forrest, G. E. Gull, and J. F. McCarthy. **270**, 645, 85-B9 (1983)
- MCCINTOCK, J. H0323+022: A Puzzling High-Latitude X-Ray/Optical/Radio Source. R. Duxsey, H. Bradt, J. McClintock, L. Petro, R. Remillard, G. Ricker, D. Schwartz, and K. Wood. **264**, L43, 11-A14 (1983)
- MCCINTOCK, J. E. Periodic Variability of the X-Ray Nova A0620-00 in Quiescence. J. E. McClintock, L. D. Petro, R. A. Remillard, and G. R. Ricker. **266**, L27, 32-B12 (1983)
- MCCLOURE, ROBERT D. Radial Velocities of a Random Sample of K Giant Stars and Implications Concerning Multiplicity among Giant Stars in Clusters. Hugh C. Harris and Robert D. McClure. **265**, L77, 26-D6 (1983)
- The Binary Nature of the Barium Stars. II. Velocities, Binary Frequency, and Preliminary Orbits. Robert D. McClure. **268**, 264, 54-G3 (1983)
- MCCLOSKEY, GEORGE E. IUE Observations of Gas Stream Effects in the Ultraviolet Spectrum of U Cephei: Erratum. Yoji Kondo, George E. McCluskey, and Robert E. Stencel. **264**, 746, 10-D10 (1983) (Orig. paper in **233**, 906, 103-D11)
- International Ultraviolet Explorer Observations of the Peculiar Variable Spectrum of the Eclipsing Binary R Arae. George E. McCluskey and Yoji Kondo. **266**, 755, 36-E6 (1983)
- MCCLYMONT, A. N. Flare Loop Radiative Hydrodynamics. I. Basic Methods. A. N. McClymont and Richard C. Canfield. **265**, 483, 17-C9 (1983)
- Flare Loop Radiative Hydrodynamics. II. Thermal Stability of Empirical Models. A. N. McClymont and Richard C. Canfield. **265**, 497, 17-D9 (1983)
- Flare Loop Radiative Hydrodynamics. III. Nonlocal Radiative Transfer Effects. Richard C. Canfield, George H. Fisher, and A. N. McClymont. **265**, 507, 17-E5 (1983)
- Flare Loop Radiative Hydrodynamics. IV. Dynamic Evolution of Unstable Semiempirical Loop Models. Chang-Hyuk An, Richard C. Canfield, George H. Fisher, and A. N. McClymont. **267**, 421, 44-D5 (1983)
- MCCRAY, RICHARD. Why Are Broad Emission Lines Seen in Seyfert Galaxies and Not in BL Lacertae Objects? P. W. Guilbert, A. C. Fabian, and Richard McCray. **266**, 466, 33-D6 (1983)
- X-Ray Sources in Molecular Clouds. Stephen Lepp and Richard McCray. **269**, 560, 72-E7 (1983)
- MCDERMOTT, P. N. Nonradial g-Mode Oscillations of Warm Neutron Stars. P. N. McDermott, H. M. Van Horn, and J. F. Scholl. **268**, 837, 62-C5 (1983)
- MCDONNELL, D. VLA Observations of a Solar Active Region and Coronal Loops. D. McDonnell and M. R. Kundu. **269**, 698, 74-A13 (1983)
- MCELROY, DOUGLAS B. Dynamics of the Stellar Component of the Bulge of M31. Douglas B. McElroy. **270**, 485, 83-D12 (1983)
- MCGONEGAL, R. The Near-Infrared Cepheid Distance Scale. I. Preliminary Galactic Calibration. R. McGonegal, C. W. McAlary, R. A. McLaren, and B. F. Madore. **269**, 641, 73-D10 (1983)
- The Distance to NGC 6822 from Infrared Photometry of Cepheids. Christopher W. McAlary, Barry F. Madore, R. McGonegal, R. A. McLaren, and D. L. Welch. **273**, 539, 119-D12 (1983)
- Cepheids in Open Clusters and Associations. J. D. Fernie and R. McGonegal. **275**, 732, 145-E1 (1983)
- MCGONEGAL, R. J. A Near-Infrared and Optical Study of X-Ray Selected Seyfert Galaxies. I. Observations. Christopher W. McAlary, R. A. McLaren, R. J. McGonegal, and J. Maza. **52**, 341, 15-A8 (1983) (Abstr. in **270**, 779, 86-E6)
- MCGRAW, JOHN T. Two Hot, Low-Field Magnetic DA White Dwarfs. James Liebert, Gary D. Schmidt, Richard F. Green, H. S. Stockman, and John T. McGraw. **264**, 262, 3-F7 (1983)
- MCINTOSH, P. S. Solar Proton Flares with Weak Impulsive Phases. E. W. Cliver, S. W. Kahler, and P. S. McIntosh. **264**, 699, 10-A2 (1983)
- MCKEE, CHRISTOPHER F. Compton Heated Winds and Coronae

- above Accretion Disks. I. Dynamics. *Mitchell C. Begelman, Christopher F. McKee, and Gregory A. Shields.* **271**, 70, 88-F9 (1983)
- Compton Heated Winds and Coronae above Accretion Disks. II. Radiative Transfer and Observable Consequences. *Mitchell C. Begelman and Christopher F. McKee.* **271**, 89, 89-A1 (1983)
- McKENZIE, D. L. Acceleration and Confinement of Energetic Particles in the 1980 June 7 Solar Flare. *S. R. Kane, K. Kai, T. Kosugi, S. Enome, P. B. Landecker, and D. L. McKenzie.* **271**, 376, 92-A14 (1983)
- McLAREN, R. A. The Near-Infrared Cepheid Distance Scale. I. Preliminary Galactic Calibration. *R. McGonegal, C. W. McAlary, R. A. McLaren, and B. F. Madore.* **269**, 641, 73-D10 (1983)
- The Distance to NGC 6822 from Infrared Photometry of Cepheids. *Christopher W. McAlary, Barry F. Madore, R. McGonegal, R. A. McLaren, and D. L. Welch.* **273**, 539, 119-D12 (1983)
- A Near-Infrared and Optical Study of X-Ray Selected Seyfert Galaxies. I. Observations. *Christopher W. McAlary, R. A. McLaren, R. J. McGonegal, and J. Maza.* **52**, 341, 15-A8 (1983) (Abstr. in **270**, 779, 86-E6)
- McNALLY, D. Abundances of Carbon-bearing Diatomic Molecules in Diffuse Interstellar Clouds. *R. L. Dickman, W. B. Somerville, D. C. B. Whittet, D. McNally, and J. C. Blades.* **53**, 55, 17-E2 (1983) (Abstr. in **271**, 891, 99-B13)
- MEEKINS, J. F. H0547-14: X-Ray Flux from a Weak Gamma-Ray Burst? *C. Ambruster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman.* **269**, 779, 75-A6 (1983)
- MELCHIORRI, B. Search for Extragalactic Backgrounds in the Far-Infrared. *C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera.* **275**, L39, 148-B7 (1983)
- MELCHIORRI, F. The Irregular Distribution of Galaxies and the Anisotropies in the Microwave Background Photons. *C. Ceccarelli, F. Melchiorri, L. Pietranera, G. Dall'Oglio, and B. Melchiorri-Olivo.* **269**, L27, 76-A4 (1983)
- Search for Extragalactic Backgrounds in the Far-Infrared. *C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera.* **275**, L39, 148-B7 (1983)
- MELCHIORRI-OLIVO, B. The Irregular Distribution of Galaxies and the Anisotropies in the Microwave Background Photons. *C. Ceccarelli, F. Melchiorri, L. Pietranera, G. Dall'Oglio, and B. Melchiorri-Olivo.* **269**, L27, 76-A4 (1983)
- MELESE, P. Linear and Circular Polarization of the Cosmic Background Radiation. *P. Lubin, P. Melese, and G. Smoot.* **273**, L51, 123-A4 (1983)
- MELNICK, GARY. The 157 Micron [C II] Emission from NGC 2024: Core and Halo Components. *Noel L. Kurtz, Scott D. Smyers, Ray W. Russell, Martin Harwit, and Gary Melnick.* **264**, 538, 8-B11 (1983)
- MELOTT, ADRIAN L. Massive Neutrinos in Large-Scale Gravitational Clustering. *Adrian L. Melott.* **264**, 59, 1-E7 (1983)
- The Bend in the Correlation Function: The Surviving Imprint of Adiabatic Perturbations? *Adrian L. Melott.* **273**, L21, 117-C8 (1983)
- Pancakes and the Formation of Galaxies in a Neutrino-dominated Universe. *Paul R. Shapiro, Curtis Struck-Marcell, and Adrian L. Melott.* **275**, 413, 142-A13 (1983)
- MÉNDEZ, ROBERTO H. The Massive WC6+O6-8 Spectroscopic Binary HD 94305. *Virpi S. Niemela, Roberto H. Méndez, and Anthony F. J. Moffat.* **272**, 190, 103-B2 (1983)
- MENDIS, D. A. On the Penetration of the Solar Wind into the Cometary Ionosphere. *A. I. Ershkovich and D. A. Mendis.* **269**, 743, 74-E12 (1983)
- The Atmosphere of a Dirty-Clathrate Cometary Nucleus: A Two-Phase, Multifluid Model. *M. L. Marconi and D. A. Mendis.* **273**, 381, 116-D5 (1983)
- MENGONI, A. Neutron Capture Rates in the *r*-Process: The Role of Direct Radiative Capture. *G. J. Mathews, A. Mengoni, F.-K. Thielemann, and William A. Fowler.* **270**, 740, 86-B8 (1983)
- MERRITT, DAVID. Relaxation and Tidal Stripping in Rich Clusters of Galaxies. I. Evolution of the Mass Distribution. *David Merritt.* **264**, 24, 1-C1 (1983)
- Stellar Orbits in a Triaxial Galaxy. I. Orbits in the Plane of Rotation. *Tim de Zeeuw and David Merritt.* **267**, 571, 47-A13 (1983)
- Orbital Configurations for Gas in Elliptical Galaxies. *David Merritt and Tim de Zeeuw.* **267**, L19, 45-C9 (1983)
- MESSINA, A. Quasar Evolution and Gravitational Collapse. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti.* **269**, 57, 65-E10 (1983)
- Quasar Evolution and Gravitational Collapse: Erratum. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti.* **273**, 837, 122-F6 (1983) (Orig. paper in **269**, 57, 65-E10)
- MÉSZÁROS, P. Accreting X-Ray Pulsar Atmospheres Heated by Coulomb Deceleration of Protons. *P. Mészáros, A. K. Harding, J. G. Kirk, and D. J. Galloway.* **266**, L33, 32-C3 (1983)
- Shocks and Spherically Accreting Black Holes: A Model for Classical Quasars. *P. Mészáros and J. P. Ostriker.* **273**, L59, 123-A12 (1983)
- A Thermal Interpretation of the X-Ray Spectra of Quasars, Active Galactic Nuclei, and Cygnus X-1. *P. Mészáros.* **274**, L13, 129-A12 (1983)
- MEYER, DAVID M. Observations of Diffuse Interstellar Lines toward Stars with Low Column Densities of H<sub>2</sub>. *David M. Meyer.* **266**, L51, 32-D4 (1983)
- MEYER, P. A Quantitative Test of Solar Modulation Theory: The Proton, Helium, and Electron Spectra from 1965 through 1979. *P. Evenson, M. Garcia-Munoz, P. Meyer, K. R. Pyle, and J. A. Simpson.* **275**, L15, 141-F14 (1983)
- MEYER, PETER. Protons from the Decay of Solar Flare Neutrons. *Paul Evenson, Peter Meyer, and K. Roger Pyle.* **274**, 875, 135-A1 (1983)
- MEYER, S. S. A Search for the Sunyaev-Zel'dovich Effect at Millimeter Wavelengths. *S. S. Meyer, A. D. Jeffries, and R. Weiss.* **271**, L1, 93-A2 (1983)
- MEZZETTI, M. General Properties of Algol Binaries. *G. Giuricin, F. Mardirossian, and M. Mezzetti.* **52**, 35, 9-E1 (1983) (Abstr. in **267**, 892, 50-D14)
- MICHALITSIANOS, A. G. High Spatial Resolution VLA Observations of the R Aquarii Jet. *M. Kafatos, J. M. Hollis, and A. G. Michalitsianos.* **267**, L103, 51-C7 (1983)
- Observations of Two Peculiar Emission Objects in the Large Magellanic Cloud. *M. Kafatos, A. G. Michalitsianos, D. A. Allen, and R. E. Stencel.* **275**, 584, 144-A1 (1983)
- MICHALITSIANOS, ANDREW G. Spectrophotometric Observations of Symbiotic Stars and Related Objects. *William P. Blair, Robert E. Stencel, Walter A. Feibelman, and Andrew G. Michalitsianos.* **53**, 573, 24-F7 (1983) (Abstr. in **273**, 839, 122-F9)
- MICHAUD, GEORGES. Chemical Separation in Horizontal-Branch Stars. *Georges Michaud, Gérard Vauclair, and Sylvie Vauclair.* **267**, 256, 42-F4 (1983)
- Diffusion, Meridional Circulation, and Mass Loss in Fm-Am Stars. *Georges Michaud, David Tarasick, Yves Charland, and Claude Pelletier.* **269**, 239, 67-F14 (1983)
- MICHEL, F. CURTIS. Radio Pulsar Disk Electrodynamics. *F. Curtis Michel.* **266**, 188, 29-A9 (1983)
- MICHELS, D. J. Associations between Coronal Mass Ejections and Soft X-Ray Events. *N. R. Sheeley, Jr., R. A. Howard, M. J. Koomey, and D. J. Michels.* **272**, 349, 104-G1 (1983)
- MIDDELKOOP, FRANS. Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Baliunas, Arthur H. Vaughan, Lee*

- Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning. **275**, 752, 145-F7 (1983)
- MIDDLEDITCH, J. Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. K. O. Mason, J. Middleditch, F. A. Córdova, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer. **264**, 575, 8-E6 (1983)
- The Correlated X-Ray and Optical Time Variability of TT Arietis. K. A. Jensen, France A. Córdova, J. Middleditch, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer. **270**, 211, 79-B14 (1983)
- Infrared Study of the Crab Pulsar: The "Shoulder" Pulse and the 3.45 Micron Pulse Profile. J. Middleditch, C. Pennypacker, and M. S. Burns. **273**, 261, 115-B5 (1983)
- Infrared and Optical Pulsations from HZ Herculis and Possible 3.5 Second Infrared Pulsations from 1E 2259+586. J. Middleditch, C. R. Pennypacker, and M. S. Burns. **274**, 313, 127-B14 (1983)
- MIDDLEDITCH, JOHN. Time-resolved Ultraviolet and Optical Spectroscopy of the Pulsating X-Ray Source H2252-035. France A. Córdova, E. E. Fenimore, John Middleditch, and Keith O. Mason. **265**, 363, 16-B1 (1983)
- Optical Pulsations from HZ Herculis/Hercules X-1: The Self-consistent 35 Day Picture. John Middleditch. **275**, 278, 140-A14 (1983)
- MIGLIUOLO, S. Magnetohydrodynamic Stability of Line-tied Coronal Arcades. I. Force-free Magnetic Fields without Embedded Prominences. S. Migliuolo and P. J. Cargill. **271**, 820, 98-D7 (1983)
- MIHALAS, BARBARA WEIBEL. On the Propagation of Acoustic Waves in a Radiating Fluid. Dimitri Mihalas and Barbara Weibel Mihalas. **273**, 355, 116-B6 (1983)
- MIHALAS, DIMITRI. Comments on the Dynamical Effects of Radiative Viscosity. Dimitri Mihalas. **266**, 242, 29-E7 (1983)
- On the Propagation of Acoustic Waves in a Radiating Fluid. Dimitri Mihalas and Barbara Weibel Mihalas. **273**, 355, 116-B6 (1983)
- Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. Sallie L. Baliunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning. **275**, 752, 145-F7 (1983)
- MILGROM, M. A Modification of the Newtonian Dynamics as a Possible Alternative to the Hidden Mass Hypothesis. M. Milgrom. **270**, 365, 82-B5 (1983)
- A Modification of the Newtonian Dynamics: Implications for Galaxies. M. Milgrom. **270**, 371, 82-B11 (1983)
- A Modification of the Newtonian Dynamics: Implications for Galaxy Systems. M. Milgrom. **270**, 384, 82-C10 (1983)
- MILKEY, R. W. Structure and Spectrum of Quiescent Prominences. IV. The Ultraviolet Ionization Continua of Hydrogen and Helium. J. N. Heasley and R. W. Milkey. **268**, 398, 56-C1 (1983)
- MILLER, GLENN E. Effects of Galaxy Collisions on the Structure and Evolution of Galaxy Clusters. I. Mass and Luminosity Functions and Background Light. Glenn E. Miller. **268**, 495, 58-D9 (1983)
- A Comparison of Theoretical to Observed Type I Supernova Rates. Glenn E. Miller and Roger A. Chevalier. **274**, 840, 134-E2 (1983)
- MILLER, H. R. The Optical Variability and Spectrum of PKS 2155-304. H. R. Miller and H. A. McAlister. **272**, 26, 101-C3 (1983)
- MILLER, J. S. Multifrequency Observations of the Flaring Quasar 1156+295. A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea. **274**, 101, 125-A9 (1983)
- MILLER, JOSEPH C. The Nature of the Ionizing Source of the Nuclear Gas in NGC 1052. William C. Keel and Joseph C. Miller. **266**, L89, 39-B4 (1983)
- MILLER, JOSEPH S. Evidence for a Highly Polarized Continuum in the Nucleus of NGC 1068. Joseph S. Miller and Robert R. J. Antonucci. **271**, L7, 93-A8 (1983)
- MILLER, R. H. Numerical Experiments on the Clustering of Galaxies. R. H. Miller. **270**, 390, 82-D2 (1983)
- MIRABEL, I. F. Neutral Hydrogen Absorption in Early Spiral Galaxies. I. F. Mirabel. **270**, L35, 87-A7 (1983)
- MITAKE, SHINICHI. Amorphous Glassy Plasma in Dense Stellar Matter. Setsuo Ichimaru, Hiroshi Iyetomi, Shinichi Mitake, and Naoki Itoh. **265**, L83, 26-D11 (1983)
- Electrical and Thermal Conductivities of Dense Matter in the Liquid Metal Phase. I. High-Temperature Results. Naoki Itoh, Shinichi Mitake, Hiroshi Iyetomi, and Setsuo Ichimaru. **273**, 774, 122-A10 (1983)
- MITCHELL, GEORGE F. Effects of a Shock on the Molecular Composition of a Diffuse Interstellar Cloud. George F. Mitchell and Terry J. Deveau. **266**, 646, 35-C12 (1983)
- MITCHELL, KENNETH J. 21 Centimeter H I Absorption at  $z = 0.437$  against the Extended Radio Structure of 3C 196. Robert L. Brown and Kenneth J. Mitchell. **264**, 87, 1-G7 (1983)
- Low Frequency Asymptotic Spectra of Multiple, Decelerating Adiabatic Bursts. Peter D. Usher, Ke-Liang Huang, Kenneth J. Mitchell, and Joseph T. Pollock. **264**, 451, 7-C2 (1983)
- MITCHELL, R. M. The Spectral and Spatial Distribution of Radiation from Eta Carinae. III. A High-Resolution 2.2 Micron Map and Morphological Considerations of the Evolutionary Status. R. M. Mitchell, G. Robinson, A. R. Hyland, and T. J. Jones. **271**, 133, 89-D5 (1983)
- MITSUDA, K. Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsuoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs. **271**, 793, 98-B8 (1983)
- MIYAMOTO, S. see also LAWRENCE, A., et al
- MIYAMOTO, S. Observations of Centaurus X-3 by Hakucho. T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the Hinotori Satellite. T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto. **270**, L83, 87-D11 (1983)
- MOFFAT, A. F. J. Discovery of a Redshift  $z = 1.2$  Quasar with a Flat Radio Spectrum in the Field of the Gamma-Ray Source CG 195+04. A. F. J. Moffat, R. Schlickeiser, M. M. Shara, W. Sieber, R. Tuffs, and H. Kühr. **271**, L45, 100-A4 (1983)



- MOFFAT, ANTHONY F. J. WY Sagittae (Nova 1783): Spectroscopic Confirmation of Weaver's Candidate and Discovery of Deep Eclipses. *Michael M. Shara and Anthony F. J. Moffat*. **264**, 560, 8-D5 (1983)
- Spectroscopic and Photometric Analysis of the WN7 Eclipsing Binary CQ Cephei. *Kam-Ching Leung, Anthony F. J. Moffat, and Wilhelm Seggewiss*. **265**, 961, 23-C9 (1983)
- A Spectroscopic Study of Four Late-Type Galactic WN Stars: The Question of Duplicity. *Robert Lamontagne, Anthony F. J. Moffat, and Wilhelm Seggewiss*. **269**, 596, 73-A1 (1983)
- The Massive WC6+O6-8 Spectroscopic Binary HD 94305. *Virpi S. Niemela, Roberto H. Méndez, and Anthony F. J. Moffat*. **272**, 190, 103-B2 (1983)
- Wolf-Rayet Stars in the Local Group Galaxies M31 and NGC 6822. *Anthony F. J. Moffat and Michael M. Shara*. **273**, 544, 119-E3 (1983)
- MOFFAT, J. W. Quadrupole Moment of the Sun and the Planetary Orbits. *L. Campbell and J. W. Moffat*. **275**, L77, 148-E1 (1983)
- MOFFET, A. T. VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young*. **272**, 383, 106-A5 (1983)
- MOK, YUNG. Microwave Signatures from a Reconnecting Plasma Pinch, with Application to Loop Flares. *Yung Mok*. **275**, 901, 147-D2 (1983)
- MONETI, A. Simultaneous Visual-Infrared Polarimetry of QSOs. *J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti*. **265**, 625, 19-D6 (1983)
- MONSIGNORI FOSSI, BRUNELLA C. Far-Ultraviolet Diffuse Emission Lines from the Interstellar Medium. *Francesco Paresce, Brunella C. Monsignori Fossi, and Massimo Landini*. **266**, L107, 39-C7 (1983)
- MONTMERLE, T. Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Bucheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Willis*. **274**, 231, 126-C13 (1983)
- MONTMERLE, THIERRY. Einstein Observations of the Rho Ophiuchi Dark Cloud: An X-Ray Christmas Tree. *Thierry Montmerle, Lydie Koch-Miramond, Edith Falgarone, and Jonathan E. Grindlay*. **269**, 182, 67-A11 (1983)
- MOODY, J. E. Filamentary Galaxy Clustering: A Mapping Algorithm. *J. E. Moody, Edwin L. Turner, and J. Richard Gott III*. **273**, 16, 112-B7 (1983)
- MOORE, RICHARD L. Optical Polarimetry of Broad-Line Radio Galaxies. *Richard J. Rudy, G. D. Schmidt, H. S. Stockman, and Richard L. Moore*. **271**, 59, 88-E8 (1983)
- MOOS, H. W. Temporal Variations of the Jovian H I Lyman-Alpha Emission (1979-1982). *T. E. Skinner, S. T. Durrance, P. D. Feldman, and H. W. Moos*. **265**, L23, 18-F6 (1983)
- IUE Spectrum of the Io Torus: Identification of the  $^1S_{2,1} \rightarrow ^3P_{2,1}$  Transitions of S III. *H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou*. **275**, L19, 141-G4 (1983)
- MORABITO, DAVID D. VLBI Observations of the Nucleus of Centaurus A. *Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson*. **266**, L93, 39-B8 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. *Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson*. **268**, L23, 57-B13 (1983)
- A Statistical VLBI Study of Milli-Arcsecond Cores in Extragalactic Radio Sources. *Robert A. Preston, David D. Morabito, and David L. Jauncey*. **269**, 387, 70-F8 (1983)
- MORAN, J. M. Water-Vapor Masers Located near Herbig-Haro Objects. *A. D. Haschick, J. M. Moran, L. F. Rodriguez, and P. T. P. Ho*. **265**, 281, 15-B13 (1983)
- Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck*. **271**, L31, 93-C3 (1983)
- MORAN, JAMES M. Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? *José M. Torrelles, Luis F. Rodriguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho*. **274**, 214, 126-B10 (1983)
- MORBEY, CHRISTOPHER. Brightest Members of Rich and Poor Clusters of Galaxies. I. Surface Brightness Profiles of cD Type Galaxies. *Christopher Morbey and Stephen Morris*. **274**, 502, 130-E9 (1983)
- MORENO, G. Search for Extragalactic Backgrounds in the Far-Infrared. *C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera*. **275**, L39, 148-B7 (1983)
- MORFILL, G. E. Evidence for the Stochastic Acceleration of Cosmic Rays in Supernova Remnants. *T. W. Hartquist and G. E. Morfill*. **266**, 271, 29-G10 (1983)
- MORGAN, W. W. Morphology of Optical Forms of N Galaxies. *W. W. Morgan and Richard D. Dreier*. **269**, 438, 71-C3 (1983)
- MORRIS, JEFFREY. A Multiwavelength Comparison of Cassiopeia A and Tycho's Supernova Remnant: Erratum. *John R. Dickel, Stephen S. Murray, Jeffrey Morris, and Donald C. Wells*. **264**, 746, 10-D10 (1983) (Orig. paper in **257**, 145, 62-E6)
- MORRIS, M. Molecular Self-Shielding in the Outflows from Late-Type Stars. *M. Morris and M. Jura*. **264**, 546, 8-C5 (1983)
- The Nature of NML Cygnus. *M. Morris and M. Jura*. **267**, 179, 41-G9 (1983)
- MORRIS, MARK. SiS Maser Emission from IRC +10°216. *Christian Henkel, Henry E. Matthews, and Mark Morris*. **267**, 184, 42-A1 (1983)
- Warm H I Halos around Molecular Clouds. *Peter G. Wannier, Stephen M. Lichten, and Mark Morris*. **268**, 727, 61-B5 (1983)
- MORRIS, STEPHEN. Brightest Members of Rich and Poor Clusters of Galaxies. I. Surface Brightness Profiles of cD Type Galaxies. *Christopher Morbey and Stephen Morris*. **274**, 502, 130-E9 (1983)
- MORRISON, D. The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams*. **274**, 168, 125-F6 (1983)
- MORRISON, NANCY D. Mass Loss in HR 1040 (A0 Ia): Analysis of Mg II  $\lambda$ 2802 and H $\alpha$ . *Paul B. Kunasz, Nancy D. Morrison, and B. Spessart*. **266**, 739, 36-D4 (1983)
- MORRISON, ROBERT. Interstellar Photoelectric Absorption Cross Sections, 0.03-10 keV. *Robert Morrison and Dan McCammon*. **270**, 119, 78-C4 (1983)
- MORTON, D. C. Interstellar Absorption Lines in the Spectrum of 3C 273. *D. G. York, C. C. Wu, S. Ratcliff, J. C. Blades, L. L. Cowie, and D. C. Morton*. **274**, 136, 125-D2 (1983)
- MORTON, DONALD C. Infall and Outflow of S<sup>++</sup> Ions in 15 Monocerotis, Tau Canis Majoris, and Iota Orionis. *Donald C. Morton*. **268**, 217, 54-C12 (1983)
- Some Constraints on the Color-Magnitude Diagram of Giants in the Galactic Spheroid. *John N. Bahcall, Raymond M. Soneira, Donald C. Morton, and K. P. Tritton*. **272**, 627, 108-E14 (1983)
- MOSELEY, J. T. Resonant and Nonresonant Processes in the Formation of CH<sup>+</sup> by Radiative Association. *M. M. Graff, J. T. Moseley, and E. Roueff*. **269**, 796, 75-B9 (1983)
- MOSS, C. The Magellanic Irregular Galaxy DDO 155. *G. de Vaucouleurs and C. Moss*. **271**, 123, 89-C7 (1983)
- MOTCH, C. Optical Candidates for the 1978 November 19 Gamma-

- Ray Burst Source. *H. Pedersen, C. Motch, M. Tarengi, J. Danziger, G. Pizzichini, and W. H. G. Lewin*. **270**, L43, 87-A14 (1983)
- MOULD, J. R. Kinematics of the Late M Stars in the Galactic Nuclear Bulge. *J. R. Mould*. **266**, 255, 29-F6 (1983)
- Stellar Populations in Local Group Dwarf Elliptical Galaxies. I. NGC 147. *J. R. Mould, Jerome Kristian, and G. S. Da Costa*. **270**, 471, 83-C10 (1983)
- MOULD, JEREMY. A Distance Scale from the Infrared Magnitude/ $H$  I Velocity-Width Relation. IV. The Morphological Type Dependence and Scatter in the Relation; the Distances to Nearby Groups. *Marc Aaronson and Jeremy Mould*. **265**, 1, 12-A6 (1983)
- The Carina Dwarf Spheroidal—An Intermediate Age Galaxy. *Jeremy Mould and Marc Aaronson*. **273**, 230, 119-C14 (1983)
- MOUSCHOVIA, TELEMACHOS CH. The Magnetic Flux Problem and Ambipolar Diffusion during Star Formation: One-dimensional Collapse. I. Formulation of the Problem and Method of Solution. *Efthimios V. Paleologou and Telemachos Ch. Mouschovias*. **275**, 838, 146-F5 (1983)
- MOZURKEWICH, DAVID. Carbon Monoxide Emission from Planetary Nebulae and Their Possible Precursors. *Harley A. Thronson, Jr. and David Mozurkewich*. **271**, 611, 96-B12 (1983)
- MUHLEMAN, DUANE O. A Measurement of the  $^{12}\text{CO}/^{13}\text{CO}$  Ratio in the Mesosphere of Venus. *R. Todd Clancy and Duane O. Muhleman*. **273**, 829, 122-E11 (1983)
- MÜHLHAUSER, K.-H. Determination of the Solar Wind Angular Momentum Flux from the *Helios* Data—An Observational Test of the Weber and Davis Theory. *V. Pizzo, R. Schwenn, E. Marsch, H. Rosenbauer, K.-H. Mühlhäuser, and F. M. Neubauer*. **271**, 335, 91-E14 (1983)
- MULLAN, D. J. Closed and Open Magnetic Fields in Stellar Winds. *D. J. Mullan and R. S. Steinolfson*. **266**, 823, 37-C14 (1983)
- Isotopic Anomalies among Solar Energetic Particles: Contribution of Preacceleration in Collapsing Magnetic Neutral Sheets. *D. J. Mullan*. **268**, 385, 56-B2 (1983)
- Release of Solar Cosmic Rays from the Corona: Rayleigh-Taylor Instability and Reconnection. *D. J. Mullan*. **269**, 765, 74-G6 (1983)
- Momentum Flux Invariance in the Solar Wind. *D. J. Mullan*. **272**, 325, 104-D14 (1983)
- MUMMA, M. J. Measurements of Stratospheric Ethane in the Jovian South Polar Regions from Infrared Heterodyne Spectroscopy of the  $\nu_2$  Band near 12 Microns. *T. Kostiuik, M. J. Mumma, F. Espenak, D. Deming, D. E. Jennings, W. Maguire, and D. Zipoy*. **265**, 564, 18-B9 (1983)
- Diode Laser Heterodyne Observations of Silicon Monoxide in Sunspots: A Test of Three Sunspot Models. *D. A. Glenar, D. Deming, D. E. Jennings, T. Kostiuik, and M. J. Mumma*. **269**, 309, 68-E4 (1983)
- MUNDT, REINHARD. Jets from Pre-Main-Sequence Stars: AS 353A and Its Associated Herbig-Haro Objects. *Reinhard Mundt, John Stocke, and Hervey S. Stockman*. **265**, L71, 26-C13 (1983)
- HH 1 and HH 2: The Results of an Eruptive Event in the Cohen-Schwartz Star? *Reinhard Mundt and Lee Hartmann*. **268**, 766, 61-E2 (1983)
- Observations of Suspected Low-Mass Post-T Tauri Stars and Their Evolutionary Status. *Reinhard Mundt, Frederick M. Walter, Eric D. Feigelson, Ulrich Finkenzeller, George H. Herbig, and Andrew P. Odell*. **269**, 229, 67-F3 (1983)
- On the Contributions of the Orion Reflection Nebulosity to the Continuous UV Spectrum of the Herbig-Haro Objects HH 1 and HH 2 and of the C-S Star. *Reinhard Mundt and Adolf N. Witt*. **270**, L59, 87-C6 (1983)
- Jets from Young Stars. *Reinhard Mundt and Josef W. Fried*. **274**, L83, 136-C8 (1983)
- MUNIER, A. QUIPS: Time-dependent Properties of Quasi-invariant Self-gravitating Polytropes. *A. Munier and M. R. Feix*. **267**, 344, 43-E12 (1983)
- MURAKAMI, T. see also LAWRENCE, A., et al
- MURAKAMI, T. Observations of Centaurus X-3 by *Hakucho*. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo*. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo*. **267**, 310, 43-C6 (1983)
- Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the *Hinotori* Satellite. *T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto*. **270**, L83, 87-D11 (1983)
- MURDIN, P. MSH 15-52: A Supernova Remnant Containing Two Compact X-Ray Sources. *F. D. Seward, F. R. Harnden, Jr., P. Murdin, and David H. Clark*. **267**, 698, 48-D4 (1983)
- MURDIN, P. G. Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. *K. O. Mason, J. Middle-ditch, F. A. Córdoba, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer*. **264**, 575, 8-E6 (1983)
- MURDIN, PAUL. The Optical Identification Content of the *Einstein* Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batry, D. L. Jauncey, and David F. Malin*. **269**, 375, 70-E2 (1983)
- MURDOCH, H. S. 1107+036: An Unusual QSO-Galaxy Pair. *H. S. Murdoch, R. W. Hunstead, H. C. Arp, J. J. Condon, J. C. Blades, and E. M. Burbidge*. **265**, 610, 19-C4 (1983)
- MURDOCH, HUGH S. C IV Absorption in the High-Redshift BL Lac Object 0215+015. II. New Observations at 20 km s<sup>-1</sup> Resolution. *Max Pettini, Richard W. Hunstead, Hugh S. Murdoch, and J. Chris Blades*. **273**, 436, 118-C3 (1983)
- MURDOCK, THOMAS L. The Brighter 94 Micron Sources Observed by the Far-Infrared Sky Survey Experiment. *Stephan D. Price, K. Shivanandan, Thomas L. Murdock, and Phillip F. Bowers*. **275**, 125, 138-D8 (1983)
- MURPHY, R. J. Implications of High-Energy Neutron Observations from Solar Flares. *R. Ramaty, R. J. Murphy, B. Kozlovsky, and R. E. Lingenfelter*. **273**, L41, 117-D12 (1983)
- MURRAY, S. S. The Optical Identification Content of the *Einstein* Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batry, D. L. Jauncey, and David F. Malin*. **269**, 375, 70-E2 (1983)
- MURRAY, STEPHEN S. A Multiwavelength Comparison of Cassiopeia A and Tycho's Supernova Remnant: Erratum. *John R. Dickel, Stephen S. Murray, Jeffrey Morris, and Donald C. Wells*. **264**, 746, 10-D10 (1983) (Orig. paper in **257**, 145, 62-E6)
- MUSHOTZKY, R. F. The Absence of Rapid X-Ray Variability in Active Galaxies. *Allyn F. Tennant and R. F. Mushotzky*. **264**, 92, 2-A1 (1983)
- 2-165 keV Observations of Active Galaxies and the Diffuse Background. *R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson*. **269**, 423, 71-B2 (1983)
- Rapid X-Ray Variability from the Seyfert 1 Galaxy NGC 4051.

- F. E. Marshall, S. S. Holt, R. F. Mushotzky, and R. H. Becker. **269**, L31, 76-A7 (1983)
- MUTEL, ROBERT L. VLBI Observations of the Radio Sources 0552+398 and 1848+283: Measurements of the Departure from Equipartition. Steven R. Spangler, Robert L. Mutel, and John M. Benson. **271**, 44, 88-D7 (1983)
- MYERS, P. C. Dense Cores in Dark Clouds. I. CO Observations and Column Densities of High-Extinction Regions. P. C. Myers, Richard A. Linke, and P. J. Benson. **264**, 517, 8-A1 (1983)
- Dense Cores in Dark Clouds. II. NH<sub>3</sub> Observations and Star Formation. P. C. Myers and P. J. Benson. **266**, 309, 30-C10 (1983)
- Dense Cores in Dark Clouds. III. Subsonic Turbulence. P. C. Myers. **270**, 105, 78-B4 (1983)
- Dense Cores in Dark Clouds. IV. HC<sub>3</sub>N Observations. P. J. Benson and P. C. Myers. **270**, 589, 84-E6 (1983)
- MYERS, ROY V. Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers. **268**, 205, 54-B14 (1983)
- MYRA, ERIC S. Globular Cluster Systems in the Hydra I Elliptical Galaxies. II. William E. Harris, Malcolm G. Smith, and Eric S. Myra. **272**, 456, 106-F13 (1983)
- NAGASE, F. *see also* LAWRENCE, A., *et al*
- NAGASE, F. Observations of Centaurus X-3 by Hakucho. T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. Nagase, S. Miyamoto, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- NAGY, A. F. Charge Exchange in Solar Wind-Cometary Interactions. T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy. **268**, 889, 62-G1 (1983)
- Charge Exchange in Solar Wind-Cometary Interactions: Erratum. T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy. **274**, 919, 135-D14 (1983) (Orig. paper in **268**, 889, 63-A1)
- NAKAGAWA, Y. Induced Mass and Wave Motions in the Lower Solar Atmosphere. I. Effects of Shear Motion of Flux Tubes. S. T. Wu, Y. Q. Hu, Y. Nakagawa, and E. Tandberg-Hanssen. **266**, 866, 37-G1 (1983)
- NAKAMURA, TAKASHI. Gravitational Radiation from Particles Falling along the Symmetry Axis into a Kerr Black Hole: The Momentum Radiated. Takashi Nakamura and Mark P. Haugan. **269**, 292, 68-C14 (1983)
- NAMBU, MITSUHIRO. Interpretation of Solar Type III Radio Emission. Mitsuhiro Nambu and P. K. Shukla. **271**, L35, 93-C7 (1983)
- NARANAN, S. The Period History of the X-Ray Pulsar in MSH 15-52. M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Narayan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward. **267**, 711, 48-E5 (1983)
- X-Ray Observations of LMC X-3 with the Monitor Proportional Counter aboard the HEAO 2 Einstein Observatory: A Comparison with Cygnus X-1. M. C. Weisskopf, S. M. Kahn, W. D. Darbro, R. F. Elsner, J. E. Grindlay, S. Narayan, P. G. Sutherland, and A. C. Williams. **274**, L65, 136-B7 (1983)
- NARAYAN, RAMESH. A New Model for the Emission Geometry in PSR 0950+08. Ramesh Narayan and M. Vivekanand. **274**, 771, 133-F14 (1983)
- NARLIKAR, J. V. A Single Exhaust Model for Backward Emission in Doppler Quasars. J. V. Narlikar and K. Subramanian. **273**, 44, 112-E10 (1983)
- NATHER, R. E. The Light Curve of the ZZ Ceti Star G226-29. S. O. Kepler, E. L. Robinson, and R. E. Nather. **271**, 744, 97-E11 (1983)
- Cessation of the 63 Second Periodicity in the Light Curve of V533 Herculis. E. L. Robinson and R. E. Nather. **273**, 255, 115-A13 (1983)
- NATTA, A. High-Velocity Outflow Sources in Molecular Clouds: The Case for Low-Mass Stars. S. Beckwith, A. Natta, and E. E. Salpeter. **267**, 596, 47-C12 (1983)
- NAYLOR, D. A. IR Maps of M17 in the [O III] 88 Micron and 52 Micron Lines and [N III] 57 Micron Line Measurements. R. J. Emery, D. A. Naylor, B. Fitton, I. Furniss, R. E. Jennings, and K. J. King. **268**, 721, 61-A12 (1983)
- NETZER, HAGAI. Are There Any Shock-heated Galaxies? Gary J. Ferland and Hagai Netzer. **264**, 105, 2-B1 (1983)
- Broad Emission Features in QSOs and Active Galactic Nuclei. I. New Calculations of Fe II Line Strengths. Hagai Netzer and Beverley J. Wills. **275**, 445, 142-D4 (1983)
- NEUBAUER, F. M. Determination of the Solar Wind Angular Momentum Flux from the Helios Data—An Observational Test of the Weber and Davis Theory. V. Pizzo, R. Schwenn, E. Marsch, H. Rosenbauer, K.-H. Mühllhäuser, and F. M. Neubauer. **271**, 335, 91-E14 (1983)
- NEUGEBAUER, G. Infrared/Optical Energy Distributions of High-Redshift Quasars. B. T. Soifer, G. Neugebauer, J. B. Oke, K. Matthews, and J. H. Lacy. **265**, 18, 12-B12 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek. **268**, 68, 52-F3 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea. **274**, 101, 125-A9 (1983)
- NEWELL, R. T. Radio Emission from Antares and an Ionized Cavity in Its Wind. R. M. Hjellming and R. T. Newell. **275**, 704, 154-C1 (1983)
- NEWTON, LYNETTE M. Further Observations of the Long-Period Binary Pulsar PSR 0820+02. R. N. Manchester, Lynette M. Newton, D. J. Cooke, P. R. Backus, M. Damashek, J. H. Taylor, and J. J. Condon. **268**, 832, 62-B14 (1983)
- NG, L. K. Prediction of Interstellar Antiproton Flux Using a Nonuniform Galactic Disk Model. L. C. Tan and L. K. Ng. **269**, 751, 74-F6 (1983)
- NICHOLSON, G. *see* LAWRENCE, A., *et al*
- NICOLSON, G. D. VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young. **272**, 383, 106-A5 (1983)
- NICOLSON, GEORGE D. VLBI Observations of the Nucleus of Centaurus A. Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson. **266**, L93, 39-B8 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson. **268**, L23, 57-B13 (1983)
- NIEDNER, MALCOLM B., JR. The Effect of MHD Instabilities on the Flaring of Cometary Plasma Tails. Malcolm B. Niedner, Jr., Alexander I. Ershkovich, and John C. Brandt. **272**, 362,

- 105-A3 (1983)
- NIEL, M. Multispacecraft Hard X-Ray Observations of Fine Time Structure in Two Solar Flares. *K. Hurley, M. Niel, R. Talon, I. V. Estulin, and V. Ch. Dolidze*. **265**, 1076, 24-E1 (1983)
- NIELL, A. E. VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young*. **272**, 383, 106-A5 (1983)
- NIEMELA, VIRPI S. The Massive WC6+O6-8 Spectroscopic Binary HD 94305. *Virpi S. Niemela, Roberto H. Méndez, and Anthony F. J. Moffat*. **272**, 190, 103-B2 (1983)
- NISENSEN, P. Speckle Image Reconstruction of Solar Features. *R. V. Stachnik, P. Nisenson, and R. W. Noyes*. **271**, L37, 93-C9 (1983)
- NITTA, N. Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the *Hinotori* Satellite. *T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto*. **270**, L83, 87-D11 (1983)
- NOAH, P. V. Observations of Active Chromosphere Stars. *Bernard W. Bopp, John L. Africano, R. E. Stencel, P. V. Noah, and A. Klimke*. **275**, 691, 145-B2 (1983)
- NOERDLINGER, PETER D. Evolutionary Effects of Helium Diffusion in Population II Stars. *Guy S. Stringfellow, Peter Bodenheimer, Peter D. Noerdlinger, and Richard J. Arigo*. **264**, 228, 3-C14 (1983)
- NOLAN, P. L. A Feature in the X-Ray Spectrum of Cygnus X-1: A Possible Positron Annihilation Line. *P. L. Nolan and J. L. Matteson*. **265**, 389, 16-C13 (1983)
- NOLT, I. G. Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. *J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radoslitz, W. C. Priedhorsky, J. Terrell, and E. N. Walker*. **271**, L65, 100-B8 (1983)
- Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radoslitz, W. Glaccum, D. A. Harper, and F. J. Low*. **273**, 58, 112-F10 (1983)
- NOLTHENIUS, R. A. The Infall of a Star into a Massive Black Hole. *R. A. Nolthenius and J. I. Katz*. **269**, 297, 68-D5 (1983)
- NOONAN, THOMAS W. The Motion of Short-Wavelength Photons in Gravitating, Refractive Media. *Thomas W. Noonan*. **264**, 627, 9-B9 (1983)
- The Optical Scalar Equations in the Presence of a Refractive Medium. *Thomas W. Noonan*. **265**, 451, 17-A5 (1983)
- Image Distortion by Gravitational Lensing. *Thomas W. Noonan*. **270**, 245, 79-E10 (1983)
- NORDTVEDT, KENNETH. Relativistic Tidal Forces. *Kenneth Nordtvedt*. **264**, 620, 9-B2 (1983)
- NORMAN, C. A. Centrifugally Driven Winds from Contracting Molecular Disks. *R. E. Pudritz and C. A. Norman*. **274**, 677, 132-G4 (1983)
- NORMAN, COLIN. The Dynamics and Fueling of Active Nuclei. *Colin Norman and Joseph Silk*. **266**, 502, 33-F14 (1983)
- Stellar and Gaseous Dynamics of Triaxial Galaxies. *George Lake and Colin Norman*. **270**, 51, 77-E2 (1983)
- X-Ray Emission from Pre-Main-Sequence Stars, Molecular Clouds, and Star Formation. *Joseph Silk and Colin Norman*. **272**, L49, 111-A12 (1983)
- NORMAN, MICHAEL L. Bubbles, Jets, and Clouds in Active Galactic Nuclei. *Michael D. Smith, Larry Smarr, Michael L. Norman, and James R. Wilson*. **264**, 432, 7-A11 (1983)
- NORRIS, JOHN. The Cyanogen Distribution of the Red Giants in M5. *Graeme H. Smith and John Norris*. **264**, 215, 3-C1 (1983)
- The Chemical Inhomogeneity of M22. *John Norris and K. C. Freeman*. **266**, 130, 28-D5 (1983)
- The Ellipticities of Globular Clusters and the Second Parameter Problem. *John Norris*. **272**, 245, 103-F3 (1983)
- The Al i-Cyanogen Correlation in the Spectra of Globular Cluster Red Giants and the Origin of Intercluster Heavy Element Variations. *John Norris and Graeme H. Smith*. **272**, 635, 108-F8 (1983)
- The Oxygen Abundance in the Clouds Producing the Ly $\alpha$ -Ly $\beta$  Absorption Systems in the Quasars 4C 5.34 (0805+046) and OQ 172 (1442+101). *John Norris, F. D. A. Hartwick, and B. A. Peterson*. **273**, 450, 118-D4 (1983)
- The Chemical Inhomogeneity of M22: Erratum. *John Norris and K. C. Freeman*. **273**, 837, 122-F6 (1983) (Orig. paper in **266**, 130, 28-D5)
- The Cyanogen Distribution of the Giants in NGC 2808. *John Norris and Graeme H. Smith*. **275**, 120, 138-D1 (1983)
- NOUSEK, J. A. IUE Observations of E1405-451: A New AM Herculis Type Cataclysmic Variable. *J. A. Nousek and S. H. Pravdo*. **266**, L39, 32-C8 (1983)
- HEAO A-2 Soft X-Ray Source Catalog. *J. J. Nugent, K. A. Jensen, J. A. Nousek, G. P. Garmire, K. O. Mason, F. M. Walter, C. S. Bowyer, R. A. Stern, and G. R. Riegler*. **51**, 1, 1-A2 (1983) (Abstr. in **263**, 1007, 142-F8)
- NOYES, R. Solar Emission Lines near 12 Microns. *J. Brault and R. Noyes*. **269**, L61, 76-C5 (1983)
- NOYES, R. W. Speckle Image Reconstruction of Solar Features. *R. V. Stachnik, P. Nisenson, and R. W. Noyes*. **271**, L37, 93-C9 (1983)
- Identification of the Solar Emission Lines near 12 Microns. *E. S. Chang and R. W. Noyes*. **275**, L11, 141-F11 (1983)
- NOYES, ROBERT W. Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Baliunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning*. **275**, 752, 145-F7 (1983)
- NUGENT, J. J. HEAO A-2 Soft X-Ray Source Catalog. *J. J. Nugent, K. A. Jensen, J. A. Nousek, G. P. Garmire, K. O. Mason, F. M. Walter, C. S. Bowyer, R. A. Stern, and G. R. Riegler*. **51**, 1, 1-A2 (1983) (Abstr. in **263**, 1007, 142-F8)
- NUSSBAUMER, H. The Evidence for Shell Formation in V1016 Cygni. *W. Deul and H. Nussbaumer*. **271**, L19, 93-B4 (1983)
- NYMAN, L.-Å. The [HCO<sup>+</sup>]/[HOC<sup>+</sup>] Abundance Ratio in Molecular Clouds. *R. C. Woods, C. S. Gudeman, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarson, L.-Å. Nyman, and H. Olofsson*. **270**, 583, 84-D14 (1983)
- O'BRIEN, GEORGE T. The Ultraviolet Spectra of Three N-Type Carbon Stars. *Hollis R. Johnson and George T. O'Brien*. **265**, 952, 23-B14 (1983)
- O'CONNELL, R. F. Absorption of Radiation Propagating Obliquely in a Magnetoplasma. *A. Khandker, R. F. O'Connell, and G. W. Ford*. **269**, 668, 73-F11 (1983)
- O'CONNELL, ROBERT W. Star Formation in the Semistellar Nucleus of M33. *Robert W. O'Connell*. **267**, 80, 40-G7 (1983)
- Accretion-driven Star Formation in Central Dominant Galaxies in X-Ray Clusters. *Craig L. Sarazin and Robert W. O'Connell*. **268**, 552, 59-B2 (1983)
- ODA, M. *see also* LAWRENCE, A., *et al*
- ODA, M. Observations of Centaurus X-3 by *Hakucho*. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo*. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo*. **267**, 310,



- 43-C6 (1983)  
 Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the *Hinotori* Satellite. *T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto.* **270**, L83, 87-D11 (1983)  
 Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. *A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsuoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs.* **271**, 793, 98-B8 (1983)  
 O'DEA, C. P. Opacity Effects at Radio Wavelengths in the Quasar 1308+326. *C. P. O'Dea, W. A. Dent, and T. J. Balonek.* **266**, L1, 32-A2 (1983)  
 The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanfili, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski.* **274**, 62, 124-E11 (1983)  
 Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea.* **274**, 101, 125-A9 (1983)  
 ODELL, ANDREW. The Chemical Composition of Distant Globular Clusters: Are There Any Metal-poor Clusters? *Catherine A. Pilachowski, Gregory D. Bothun, Edward W. Olszewski, and Andrew Odell.* **273**, 187, 114-C5 (1983)  
 ODELL, ANDREW. P. Observations of Suspected Low-Mass Post-T Tauri Stars and Their Evolutionary Status. *Reinhard Mundi, Frederick M. Walter, Eric D. Feigelson, Ulrich Finkenzeller, George H. Herbig, and Andrew P. Odell.* **269**, 229, 67-F3 (1983)  
 O'DELL, C. R. A Study in H $\alpha$  Velocities in NGC 1499, NGC 7000, and IC 1318B/C. *W. F. Fountain, G. A. Gary, and C. R. O'Dell.* **269**, 164, 66-G7 (1983)  
 An H $\alpha$  Velocity Study of S252. *W. F. Fountain, G. Allen Gary, and C. R. O'Dell.* **273**, 639, 120-E5 (1983)  
 O'DELL, S. L. A Search for X-Ray Emission from Optically Quiet, Compact Radio Sources. *J. E. Ledden and S. L. O'Dell.* **270**, 434, 83-A1 (1983)  
 OEMLER, AUGUSTUS. The Evolution of Galaxies in Clusters. III. Photometry of 17 Intermediate Redshift Clusters. *Harvey Butcher, Augustus Oemler, and Donald C. Wells.* **52**, 183, 12-A2 (1983) (Abstr. in **269**, 809, 75-C8)  
 OEMLER, AUGUSTUS, JR. The Kinematics of Globular Clusters in the Large Magellanic Cloud. *K. C. Freeman, Garth Illingworth, and Augustus Oemler, Jr.* **272**, 488, 107-B7 (1983)  
 OGAWA, H. Molecular Emission Which Is Probably Localized within the Central 10 Parsecs of the Galaxy. *Y. Fukui, H. Ogawa, and S. Deguchi.* **275**, L55, 148-C9 (1983)  
 OGAWARA, Y. *see also* LAWRENCE, A., *et al*  
 OGAWARA, Y. Observations of Centaurus X-3 by *Hakucho*. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo.* **264**, 563, 8-D8 (1983)  
 Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo.* **267**, 310, 43-C6 (1983)  
 Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the *Hinotori* Satellite. *T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto.* **270**, L83, 87-D11 (1983)  
 OHANIAN, HANS C. The Caustics of Gravitational "Lenses". *Hans C. Ohanian.* **271**, 551, 95-D14 (1983)  
 OHASHI, T. *see also* LAWRENCE, A., *et al*  
 OHASHI, T. Observations of Centaurus X-3 by *Hakucho*. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo.* **264**, 563, 8-D8 (1983)  
 Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo.* **267**, 310, 43-C6 (1983)  
 Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. *A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsuoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs.* **271**, 793, 98-B8 (1983)  
 OHKAWA, T. *see* LAWRENCE, A., *et al*  
 OHKI, K. Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the *Hinotori* Satellite. *T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto.* **270**, L83, 87-D11 (1983)  
 OKA, R. *see* LAWRENCE, A., *et al*  
 OKAMURA, S. Diameter versus Surface Brightness Diagram of Galaxies. *K. Kodaira, S. Okamura, and M. Watanabe.* **274**, L49, 136-A4 (1983)  
 OKE, J. B. Infrared/Optical Energy Distributions of High-Redshift Quasars. *B. T. Soifer, G. Neugebauer, J. B. Oke, K. Matthews, and J. H. Lacy.* **265**, 18, 12-B12 (1983)  
 IUE Observations of Markarian 3 and 6: Reddening and the Nonstellar Continuum. *Matthew A. Malkan and J. B. Oke.* **265**, 92, 13-B1 (1983)  
 Secondary Standard Stars for Absolute Spectrophotometry. *J. B. Oke and J. E. Gunn.* **266**, 713, 36-B4 (1983)  
 OKOYE, S. E. The Variations of Radio Luminosity with Epoch and Its Effect on the Angular Diameter-Redshift Relation. *Lesley I. Onuora and S. E. Okoye.* **270**, 360, 82-A14 (1983)  
 OKUDA, H. *see* LAWRENCE, A., *et al*  
 OLIVERSEN, NANCY A. Observational Studies of the Symbiotic Stars. II. Emission-Line Relative Intensity Variations in CI Cygni, BF Cygni, AX Persei, and V1016 Cygni. *Nancy A. Oliversen and Christopher M. Anderson.* **268**, 250, 54-F3 (1983)  
 OLOFSSON, H. The [HCO<sup>+</sup>]/[HOC<sup>+</sup>] Abundance Ratio in Molecular Clouds. *R. C. Woods, C. S. Gudeman, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarson, L.-Å. Nyman, and H. Olofsson.* **270**, 583, 84-D14 (1983)  
 OLSON, DONALD W. The Evolution of Voids in the Expanding Universe. *Mark A. Hausman, Donald W. Olson, and Bernard D. Roth.* **270**, 351, 82-A5 (1983)  
 OLSON, EDWARD C. Four-Color Photometry of RZ Ophiuchi and Its Accretion Disk. *Edward C. Olson and Jeffrey P. Hickey.* **264**, 251, 3-E9 (1983)  
 OLSZEWSKI, EDWARD. The Age and Composition of the LMC Red Globular Cluster NGC 2121. *Phillip Flower, Douglas Geisler, Paul Hodge, Edward Olszewski, and Robert Schommer.* **275**, 15, 137-B7 (1983)

- OLSZEWSKI, EDWARD W. Carbon Stars and the Seven Dwarfs. *Marc Aaronson, Edward W. Olszewski, and Paul W. Hodge.* **267**, 271, 42-G5 (1983)
- The Chemical Composition of Distant Globular Clusters: Are There Any Metal-poor Clusters? *Catherine A. Pilachowski, Gregory D. Bothun, Edward W. Olszewski, and Andrew Odell.* **273**, 187, 114-C5 (1983)
- ONDRECHEN, MARC P. Radio Continuum Observations of the Bar of NGC 1097. *Marc P. Ondrechen and J. M. van der Hulst.* **269**, L47, 76-B7 (1983)
- O'NEIL, EARL J., JR. An Optical Study of IC 1470. *Beverly T. Lynds and Earl J. O'Neil, Jr.* **265**, 803, 21-E1 (1983)
- Inhomogeneities in the Bubble Nebula, NGC 7635. *Beverly T. Lynds and Earl J. O'Neil, Jr.* **274**, 650, 132-E1 (1983)
- ONUORA, LESLEY I. The Variations of Radio Luminosity with Epoch and Its Effect on the Angular Diameter-Redshift Relation. *Lesley I. Onuora and S. E. Okoye.* **270**, 360, 82-A14 (1983)
- ORAN, E. S. Numerical Simulations of Loops Heated to Solar Flare Temperatures. I. Gasdynamics. *Chung-Chieh Cheng, E. S. Oran, G. A. Doschek, J. P. Boris, and J. T. Mariska.* **265**, 1090, 24-F4 (1983)
- Numerical Simulations of Loops Heated to Solar Flare Temperatures. II. X-Ray and UV Spectroscopy. *G. A. Doschek, Chung-Chieh Cheng, E. S. Oran, J. P. Boris, and J. T. Mariska.* **265**, 1103, 24-G3 (1983)
- ORMES, J. F. Implications of HEAO 3 Data for the Acceleration and Propagation of Galactic Cosmic Rays. *J. F. Ormes and R. J. Protheroe.* **272**, 756, 110-A8 (1983)
- ORRALL, F. Q. Submillimeter Extensions of the Solar Limb Determined from Observations of the Total Eclipse of 1982 July 31. *C. Lindsey, E. E. Becklin, J. T. Jefferies, F. Q. Orrall, M. W. Werner, and Ian Gatley.* **264**, L25, 5-B9 (1983)
- Outflow from the Sun's Polar Corona. *F. Q. Orrall, G. J. Rottman, and J. A. Klimchuk.* **266**, L65, 32-E3 (1983)
- ORWIG, L. E. Simultaneous Ultraviolet Line and Hard X-Ray Bursts in the Impulsive Phase of Solar Flares. *B. E. Woodgate, R. A. Shine, A. I. Poland, and L. E. Orwig.* **265**, 530, 17-G1 (1983)
- Millisecond Time Variations in Hard X-Ray Solar Flares. *Alan L. Kiplinger, B. R. Dennis, A. Gordon Emslie, K. J. Frost, and L. E. Orwig.* **265**, L99, 26-E11 (1983)
- Recurrent Pulse Trains in the Solar Hard X-Ray Flare of 1980 June 7. *Alan L. Kiplinger, B. R. Dennis, K. J. Frost, and L. E. Orwig.* **273**, 783, 122-B6 (1983)
- OSHEROVICH, VLADIMIR A. Magnetohydrostatic Model of Solar Faculae. *Vladimir A. Osherovich, T. Flå, and G. A. Chapman.* **268**, 412, 56-D3 (1983)
- OSHEROVICH, VLADIMIR A. Self-similar Magnetohydrostatic Model of a Quiescent Prominence. *Vladimir Osherovich.* **271**, 847, 98-F6 (1983)
- OSSMAN, W. Irregular X-Ray Variability in the Transient X-Ray Burst Source MXB 1659-29. *L. Cominsky, W. Ossman, and W. H. G. Lewin.* **270**, 226, 79-D1 (1983)
- OSTERBROCK, DONALD E. Mrk 744 and Mrk 1066: Two Seyfert Galaxies with Strong Absorption-Line Spectra. *Robert W. Goodrich and Donald E. Osterbrock.* **269**, 416, 71-A9 (1983)
- Spectra of Seyfert Galaxies and Seyfert Galaxy Candidates. *Donald E. Osterbrock and Oved Dahari.* **273**, 478, 118-F14 (1983)
- Upper Limits to O III  $\lambda 5592$  and [Ni II]  $\lambda 4594$  in Seyfert Galaxies. *Donald E. Osterbrock, Oved Dahari, and Jan Olof Ekberg.* **273**, L31, 117-D3 (1983)
- OSTRIKER, J. P. Shocks and Spherically Accreting Black Holes: A Model for Classical Quasars. *P. Mészáros and J. P. Ostriker.* **273**, L59, 123-A12 (1983)
- OSTRIKER, JEREMIAH P. The Structure and Expansion Law of a Shock Wave in an Expanding Universe. *Satoru Ikeuchi, Kohji Tomisaka, and Jeremiah P. Ostriker.* **265**, 583, 19-A5 (1983)
- The Statistics of Gravitational Lenses: Apparent Changes in the Luminosity Function of Distant Sources Due to Passage of Light through a Single Galaxy. *Mario Vietri and Jeremiah P. Ostriker.* **267**, 488, 46-B14 (1983)
- Physical Properties of the Intergalactic Medium and the Lyman-Alpha Absorbing Clouds. *Jeremiah P. Ostriker and Satoru Ikeuchi.* **268**, L63, 63-D9 (1983)
- Viscous Drag on an Accretion Disk due to an Embedded Stellar System. *Jeremiah P. Ostriker.* **273**, 99, 113-B14 (1983)
- OWEN, FRAZER N. Observations of the M87 Jet at 15 GHz with  $\theta$ 12 Resolution. *J. A. Biretta, Frazer N. Owen, and Philip E. Hardee.* **274**, L27, 129-B10 (1983)
- OWOCKI, S. P. The Effect of a Non-Maxwellian Electron Distribution on Oxygen and Iron Ionization Balances in the Solar Corona. *S. P. Owocki and J. D. Scudder.* **270**, 758, 86-C13 (1983)
- The Effect of a Coronal Shock Wave on the Solar Wind Ionization State. *S. P. Owocki and A. J. Hundhausen.* **274**, 414, 128-C3 (1983)
- The Solar Wind Ionization State as a Coronal Temperature Diagnostic. *S. P. Owocki, T. E. Holzer, and A. J. Hundhausen.* **275**, 354, 140-G6 (1983)
- PACIESAS, W. S. Hard X-Ray Observations of the Crab Nebula and A0535+26 with a High Energy Resolution Spectrometer. *J. M. Hameury, D. Boclet, Ph. Durouchoux, T. L. Cline, W. S. Paciesas, B. J. Teegarden, J. Tueller, and R. C. Haymes.* **270**, 144, 78-D14 (1983)
- PACINI, F. The Optical Luminosity of Very Fast Pulsars. *F. Pacini and M. Salvati.* **274**, 369, 127-F14 (1983)
- PACZYŃSKI, BOHDAN. A One-Zone Model for Shell Flashes on Accreting Compact Stars. *Bohdan Paczyński.* **264**, 282, 4-A1 (1983)
- Models of X-Ray Bursters with Radius Expansion. *Bohdan Paczyński.* **267**, 315, 43-C11 (1983)
- The Minimum Period and the Gap in Periods of Cataclysmic Binaries. *Bohdan Paczyński and Ryszard Sienkiewicz.* **268**, 825, 62-B7 (1983)
- Mass of Large Magellanic Cloud X-3. *Bohdan Paczyński.* **273**, L81, 123-C3 (1983)
- PADRIELLI, L. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Willis, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Willis, and W. Z. Wisniewski.* **274**, 62, 124-E11 (1983)
- PAGE, THORNTON. The S201 Far-Ultraviolet Imaging Survey. I. Two Fields at High Galactic Latitude. *George R. Carruthers and Thornton Page.* **53**, 623, 25-C1 (1983) (Abstr. in **273**, 841, 122-F11)
- PALEOLOGOU, EFTHIMIOS V. The Magnetic Flux Problem and Ambipolar Diffusion during Star Formation: One-dimensional Collapse. I. Formulation of the Problem and Method of Solution. *Efthimios V. Paleologou and Telemachos Ch. Mouschovias.* **275**, 838, 146-F5 (1983)
- PALLA, FRANCESCO. Primordial Star Formation: The Role of Molecular Hydrogen. *Francesco Palla, E. E. Salpeter, and Steven W. Stahl.* **271**, 632, 96-D6 (1983)
- PALLAVICINI, R. Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. *R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner.* **270**, 270, 79-G7 (1983)
- PALMER, PATRICK. Small Rotating Clouds of Stellar Mass in Orion Molecular Cloud 1. *Andrew Harris, C. H. Townes, D. N. Matsakis, and Patrick Palmer.* **265**, L63, 26-C6 (1983)

- An Upper Limit to the Microwave Continuum Radiation from Comet Austin (1982g). *L. E. Snyder, Patrick Palmer, and C. M. Wade*. **269**, L21, 69-B6 (1983)
- The Distribution of 6 Centimeter  $\text{H}_2\text{CO}$  in Orion Molecular Cloud I. *K. J. Johnston, Patrick Palmer, T. L. Wilson, and J. H. Bieging*. **271**, L89, 100-D2 (1983)
- PANAGIA, N. X-Ray and Ultraviolet Observations of Extragalactic H II Regions. *G. Fabbiano and N. Panagia*. **266**, 568, 34-D12 (1983)
- PANAGIA, NINO. Infrared Observations of R136, the Central Object of the 30 Doradus Nebula. *Nino Panagia, Enrico G. Tanzi, and Massimo Tarenghi*. **272**, 123, 102-D4 (1983)
- PANEK, ROBERT J. Ultraviolet Flux Distributions of Stars in the Orion Nebula Cluster. *Robert J. Panek*. **270**, 169, 78-F14 (1983)
- Ultraviolet Photometry of Dwarf Novae in Outburst. *Chi-Chao Wu and Robert J. Panek*. **271**, 754, 97-F7 (1983)
- PAPADOPOULOS, K. Selective Nonresonant Acceleration of  $^3\text{He}^{++}$  and Heavy Ions by  $\text{H}^+$  Cyclotron Waves. *H. Varvoglis and K. Papadopoulos*. **270**, L95, 87-F3 (1983)
- Stochastic Three-Wave Interaction in Flaring Solar Loops. *Loukas Vlahos, R. R. Sharma, and K. Papadopoulos*. **275**, 374, 141-A12 (1983)
- PAPP, K. A. The Effects of Mass and Metallicity upon Planetary Nebula Formation. *K. A. Papp, C. R. Purton, and S. Kwok*. **268**, 145, 53-E9 (1983)
- PARESC, FRANCESCO. Far-Ultraviolet Diffuse Emission Lines from the Interstellar Medium. *Francesco Paresce, Brunella C. Monsignor Fossi, and Massimo Landini*. **266**, L107, 39-C7 (1983)
- PARKER, E. N. Magnetic Neutral Sheets in Evolving Fields. I. General Theory. *E. N. Parker*. **264**, 635, 9-C3 (1983)
- Magnetic Neutral Sheets in Evolving Fields. II. Formation of the Solar Corona. *E. N. Parker*. **264**, 642, 9-C10 (1983)
- PARKER, P. D. Nucleosynthesis of  $^{26}\text{Al}$  at Low Stellar Temperatures. *A. E. Champagne, A. J. Howard, and P. D. Parker*. **269**, 686, 74-A1 (1983)
- PARKER, ROBERT A. R. Digital Analysis of Narrow-Band Imagery of the Cygnus Loop. *J. Jeff Hester, Robert A. R. Parker, and Reginald J. Dufour*. **273**, 219, 114-E10 (1983)
- PARRAVANO, ANTONIO. Thermochemical Instabilities in Reacting Gases. I. Plasma of Hydrogen. *Miguel H. Ibañez and Antonio Parravano*. **275**, 181, 139-A11 (1983)
- PARSONS, SIDNEY B. HD 207739: A Strange Composite Star. *Sidney B. Parsons, Albert V. Holm, and Yoji Kondo*. **264**, L19, 5-B4 (1983)
- Einstein Observations of Three Classical Cepheids. *Erika Böhm-Vitense and Sidney B. Parsons*. **266**, 171, 28-G6 (1983)
- Ultraviolet and Optical Studies of Binaries with Luminous Cool Primaries and Hot Companions. III. Reticon Radial Velocities. *Sidney B. Parsons*. **53**, 553, 24-E1 (1983) (Abstr. in **273**, 839, 122-F9)
- PARTHASARATHY, M. The R- and s-Process Nuclei in the Early History of the Galaxy: HD 122563. *Christopher Sneden and M. Parthasarathy*. **267**, 757, 49-A11 (1983)
- PATERNÒ, L. Differential Rotation in F Stars: A Comparison between Theory and Observation. *G. Belvedere and L. Paternò*. **268**, 246, 54-E13 (1983)
- X-Ray Emission of Late-Type Stars. *L. Paternò and F. Zuccarello*. **275**, L1, 141-F2 (1983)
- PATTERSON, J. Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704 + 241. *M. Garcia, S. L. Baliunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson*. **267**, 291, 43-A13 (1983)
- The Discovery of an X-Ray Bright BL Lacertae Object: 0414 + 009. *M. P. Ulmer, Robert L. Brown, D. A. Schwartz, J. Patterson, and R. G. Cruddace*. **270**, L1, 81-A2 (1983)
- PATTERSON, JOSEPH. H2215-086: King of the DQ Herculis Stars. *Joseph Patterson and J. E. Steiner*. **264**, L61, 11-C2 (1983)
- Orbital Periods of Novae before Eruption. *Bradley E. Schaefer and Joseph Patterson*. **268**, 710, 61-A1 (1983)
- PAUL, J. A. Gamma-Ray Astronomy and the Local Interstellar Medium. *F. Lebrun and J. A. Paul*. **266**, 276, 30-A1 (1983)
- Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gotwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills*. **274**, 231, 126-C13 (1983)
- PAYNE, H. E. Interpretation of Neutral Hydrogen Spin Temperature Measurements. *H. E. Payne, E. E. Salpeter, and Yervant Terzian*. **272**, 540, 107-F9 (1983)
- PEARSON, T. J. Rectilinear Motions in 3C 345. *M. H. Cohen, S. C. Unwin, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **269**, L1, 69-A3 (1983)
- Superluminal Motion in the Quasar 3C 345. *S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **271**, 536, 95-C13 (1983)
- PECHENICK, K. R. Hot Spots on Neutron Stars: The Near-Field Gravitational Lens. *K. R. Pechenick, C. Ftaclas, and J. M. Cohen*. **274**, 846, 134-E8 (1983)
- PEDERSEN, H. Optical Candidates for the 1978 November 19 Gamma-Ray Burst Source. *H. Pedersen, C. Match, M. Tarenghi, J. Danziger, G. Pizzichini, and W. H. G. Lewin*. **270**, L43, 87-A14 (1983)
- Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. *A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsuoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs*. **271**, 793, 98-B8 (1983)
- PEEBLES, P. J. E. A Survey of Galaxy Redshifts. V. The Two-Point Position and Velocity Correlations. *Marc Davis and P. J. E. Peebles*. **267**, 465, 46-A5 (1983)
- The Sequence of Cosmogony and the Nature of Primeval Departures from Homogeneity. *P. J. E. Peebles*. **274**, 1, 124-A6 (1983)
- PELAT, DIDIER. Study of the Close Environment of the Active Nucleus in NGC 1068 by Decomposition of [O III] and H $\beta$  Emission-Line Profiles. *Danielle Alloin, Didier Pelat, Alec Boksenberg, and Wallace L. W. Sargent*. **275**, 493, 142-G10 (1983)
- PELLAT, R. Radiative or Two-Stream Instability as a Source for Pulsar Radio Emission. *E. Asséo, R. Pelat, and H. Sol*. **266**, 201, 29-B8 (1983)
- PELLETIER, CLAUDE. Diffusion, Meridional Circulation, and Mass Loss in Fm-Am Stars. *Georges Michaud, David Tarasick, Yves Charland, and Claude Pelletier*. **269**, 239, 67-F14 (1983)
- PELLING, R. M. First-Order Fermi Acceleration in Solar Flares as a Mechanism for the Second-Step Acceleration of Prompt Protons and Relativistic Electrons. *T. Bai, H. S. Hudson, R. M. Pelling, R. P. Lin, R. A. Schwartz, and T. T. von Rosenvinge*. **267**, 433, 44-E3 (1983)
- PENCE, W. D. Felicity Fields in Late-Type Galaxies from Ha Fabry-Perot Interferometry. IV. Kinematics and Dynamics of the SAB(s)c Spiral NGC 5236 (M83). *G. de Vaucouleurs, W. D. Pence, and E. Davoust*. **53**, 17, 17-B6 (1983) (Abstr. in **271**, 889, 99-B11)
- PENFOLD, J. E. Discovery of a Massive Unseen Star in LMC X-3. *A. P. Cowley, D. Crampton, J. B. Hutchings, R. Remillard, and J. E. Penfold*. **272**, 118, 102-C13 (1983)
- PENNINGTON, ROBERT L. The Probable Association of SN 1957d in NGC 5236 (M83) with an Unresolved Radio Source. *Robert L. Pennington and Reginald J. Dufour*. **270**, L7, 81-A8 (1983)
- PENNYPACKER, C. Infrared Study of the Crab Pulsar: The "Shoulder" Pulse and the 3.45 Micron Pulse Profile. *J. Middleditch, C. Pennyacker, and M. S. Burns*. **273**, 261, 115-

- B5 (1983)
- PENNYPACKER, C. R. Infrared and Optical Pulsations from HZ Herculis and Possible 3.5 Second Infrared Pulsations from 1E 2259+586. *J. Middleditch, C. R. Pennyacker, and M. S. Burns*. **274**, 313, 127-B14 (1983)
- PENROD, G. DONALD. Rotational Studies of Late-Type Stars. III. Rotation among BY Draconis Stars. *Steven S. Vogt, David R. Soderblom, and G. Donald Penrod*. **269**, 250, 67-G11 (1983)
- Detection of High-Order Nonradial Oscillations on the Rapid Rotator Zeta Ophiuchi and Their Line with Be Type Outbursts. *Steven S. Vogt and G. Donald Penrod*. **275**, 661, 144-F14 (1983)
- PENZIAs, A. A. Isotopic Fractionation and Mass Motion in Giant Molecular Clouds. *A. A. Penzias*. **273**, 195, 114-C14 (1983)
- PERES, G. Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. *R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner*. **270**, 270, 79-G7 (1983)
- PERINOTTO, M. Radial Velocities of Planetary Nebulae. *Stephen E. Schneider, Yervant Terzian, A. Purgathofer, and M. Perinotto*. **52**, 399, 15-G5 (1983) (Abstr. in **270**, 779, 86-E6)
- PERKINS, GEORGE J. Metal Abundances of RR Lyrae Stars in Globular Clusters: Erratum. *Horace A. Smith and George J. Perkins*. **267**, 891, 50-D13 (1983) (Orig. paper in **261**, 576, 118-A8)
- PERLEY, P. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wiśniewski*. **274**, 62, 124-E11 (1983)
- PERLEY, RICHARD A. The Radio Structure of 3C 279. *Imke de Pater and Richard A. Perley*. **273**, 64, 112-G2 (1983)
- PERNIC, R. Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. *Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic*. **274**, L43, 129-D3 (1983)
- PERRY, DOUGLAS N. The Spectra of Wolf-Rayet Stars. I. Optical Line Strengths and the Hydrogen-to-Helium Ratios in WN Type Stars. *Peter S. Conti, E. Mykky Leep, and Douglas N. Perry*. **268**, 228, 54-D9 (1983)
- PERSI, PAOLO. Infrared Photometry and Mass Loss Rates for Of-Type Stars. *Paolo Persi, Marco Ferrari-Toniolo, and Gary L. Grasdale*. **269**, 625, 73-C5 (1983)
- PERSsON, S. E. Identification of the Emission Features near 3.5 Microns in the Pre-Main-Sequence Star HD 97048. *F. Baas, L. J. Allamandola, T. R. Geballe, S. E. Persson, and J. H. Lucy*. **265**, 290, 15-C8 (1983)
- Photometric Studies of Composite Stellar Systems. V. Infrared Photometry of Star Clusters in the Magellanic Clouds. *S. E. Persson, M. Aaronson, Judith G. Cohen, Jay A. Frogel, and K. Matthews*. **266**, 105, 28-B2 (1983)
- Globular Cluster Giant Branches and the Metallicity Scale. *Jay A. Frogel, Judith G. Cohen, and S. E. Persson*. **275**, 773, 146-A9 (1983)
- Infrared Photometry, Bolometric Luminosities, and Effective Temperatures for Giant Stars in 26 Globular Clusters. *Jay A. Frogel, S. E. Persson, and Judith G. Cohen*. **53**, 713, 26-B9 (1983) (Abstr. in **273**, 841, 122-F11)
- PESCH, PETER. The Case Low-Dispersion Northern Sky Survey. I. *Peter Pesch and N. Sanduleak*. **51**, 171, 3-D1 (1983) (Abstr. in **263**, 1006, 142-F7)
- PESNELL, W. D. The Discovery of Nonradial Instability Strips for Hot, Evolved Stars. *Sumner G. Starrfield, Arthur N. Cox, Stephen W. Hodson, and W. D. Pesnell*. **268**, L27, 57-C3 (1983)
- PEsSES, M. E. Solar Type II Radio Emission and the Shock Drift Acceleration of Electrons. *Gordon D. Holman and M. E. Pesses*. **267**, 837, 50-A1 (1983)
- PETERSON, B. A. The Oxygen Abundance in the Clouds Producing the Ly $\alpha$ -Ly $\beta$  Absorption Systems in the Quasars 4C 5.34 (0805+046) and OQ 172 (1442+101). *John Norris, F. D. A. Hartwick, and B. A. Peterson*. **273**, 450, 118-D4 (1983)
- The Clustering of Galaxies in a Complete Redshift Survey. *T. Shanks, A. J. Bean, G. Efstathiou, R. S. Ellis, R. Fong, and B. A. Peterson*. **274**, 529, 130-G8 (1983)
- PETERSON, BRADLEY M. The Effects of Seeing on Spectral Line Measurements in Seyfert 1 Galaxies. *Bradley M. Peterson and George W. Collins II*. **270**, 71, 77-F8 (1983)
- PETERSON, BRUCE A. The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin*. **269**, 375, 70-E2 (1983)
- PETERSON, L. E. 2-165 keV Observations of Active Galaxies and the Diffuse Background. *R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson*. **269**, 423, 71-B2 (1983)
- PETERSON, RUTH C. The Rotation of Horizontal-Branch Stars. I. Members of the Field. *Ruth C. Peterson, Theodore D. Tarbell, and Bruce W. Carney*. **265**, 972, 23-D6 (1983)
- The Rotation of Horizontal-Branch Stars. II. Members of the Globular Clusters M3, M5, and M13. *Ruth C. Peterson*. **275**, 737, 145-E6 (1983)
- PETHICK, C. J. Structure of Neutron Star Envelopes. *E. H. Gudmundsson, C. J. Pethick, and R. I. Epstein*. **272**, 286, 104-B2 (1983)
- PETRO, L. H0323+022: A Puzzling High-Latitude X-Ray/Optical/Radio Source. *R. Doxsey, H. Bradt, J. McClintock, L. Petro, R. Remillard, G. Ricker, D. Schwartz, and K. Wood*. **264**, L43, 11-A14 (1983)
- PETRO, L. D. Discovery of 13.5 s X-Ray Pulsations from LMC X-4 and an Orbital Determination. *R. L. Kelley, J. G. Jernigan, A. Levine, L. D. Petro, and S. Rappaport*. **264**, 568, 8-D13 (1983)
- Periodic Variability of the X-Ray Nova A0620-00 in Quiescence. *J. E. McClintock, L. D. Petro, R. A. Remillard, and G. R. Ricker*. **266**, L27, 32-B12 (1983)
- Orbital Period Changes in Centaurus X-3. *R. L. Kelley, S. Rappaport, G. W. Clark, and L. D. Petro*. **268**, 790, 61-F12 (1983)
- PETROSIA, VAHÉ. The Impulsive Phase of Solar Flares. II. Characteristics of the Hard X-Rays. *John Leach and Vahé Petrosian*. **269**, 715, 74-C12 (1983)
- PETTINI, MAX. C IV Absorption in the High-Redshift BL Lac Object 0215+015. II. New Observations at 20 km s<sup>-1</sup> Resolution. *Max Pettini, Richard W. Hunstead, Hugh S. Murdoch, and J. Chris Blades*. **273**, 436, 118-C3 (1983)
- PHELPS, DWIGHT E. Effect of Screening Due to Free Mobile Charges on the Binding Energy of an H<sup>-</sup> Ion. *Dwight E. Phelps and K. K. Bajaj*. **268**, 447, 56-F11 (1983)
- PHILIP, A. G. DAVIS. Scanner Observations of Field Horizontal-Branch A Stars. *A. G. Davis Philip and D. S. Hayes*. **53**, 751, 27-A2 (1983) (Abstr. in **274**, 920, 135-E1)
- Multichannel Spectrometer Observations of Globular Cluster Horizontal-Branch A Stars. *D. S. Hayes and A. G. Davis Philip*. **53**, 759, 27-A10 (1983) (Abstr. in **274**, 921, 135-E2)
- PHILLIPS, A. C. Simultaneous Visual-Infrared Polarimetry of QSOs. *J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti*. **265**, 625,



- 19-D6 (1983)
- PHILLIPS, K. J. H. Inner-Shell Transitions in Fe XIX-XXII in the X-Ray Spectra of Solar Flares and Tokamaks. *K. J. H. Phillips, J. R. Lemen, R. D. Cowan, G. A. Doschek, and J. W. Leibacher*. **265**, 1120, 25-A10 (1983)
- X-Ray Line Ratios from Helium-like Ions: Updated Theory and SMM Flare Observations. *C. J. Wolfson, J. G. Doyle, J. W. Leibacher, and K. J. H. Phillips*. **269**, 319, 68-F2 (1983)
- PHILLIPS, M. M. Nearby Galaxies with Seyfert-like Nuclei. *M. M. Phillips, P. A. Charles, and J. A. Baldwin*. **266**, 485, 33-E11 (1983)
- Outflow of Gas in the Seyfert I Galaxy Markarian 509. *M. M. Phillips, J. A. Baldwin, Bruce Atwood, and R. F. Carswell*. **274**, 558, 131-D1 (1983)
- PHILLIPS, R. B. VLBI Maps of 3C 147, 3C 286, 3C 380, NRAO 150, CTD 93, and 3C 395 at 2.3 GHz. *R. B. Phillips and D. B. Shaffer*. **271**, 32, 88-C9 (1983)
- PHILLIPS, T. G. First Detection of the Ground-State  $J_K = 1_{g-0}$  Submillimeter Transition of Interstellar Ammonia. *Jocelyn Keene, Geoffrey A. Blake, and T. G. Phillips*. **271**, L27, 93-B13 (1983)
- Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wootten, C. Masson, and M. A. Frerking*. **273**, 633, 120-D13 (1983)
- The Distribution of the CO  $J = 2-1$  Emission from M82. *E. C. Sutton, C. R. Masson, and T. G. Phillips*. **275**, L49, 148-C2 (1983)
- PICA, A. J. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea*. **274**, 101, 125-A9 (1983)
- PICA, ANDREW J. Optical Variability, Absolute Luminosity, and the Hubble Diagram for QSOs. *Andrew J. Pica and Alex G. Smith*. **272**, 11, 101-B2 (1983)
- PICK, M. The Association of Radio Noise Storm Enhancements with the Appearance of Additional Material in the Corona. *A. Kerdraon, M. Pick, G. Trotter, C. Sawyer, R. Illing, W. Wagner, and L. House*. **265**, L19, 18-F1 (1983)
- PIER, JEFFREY R. AB Stars in the Southern Galactic Halo. II. Spectroscopy and Radial Velocities. *Jeffrey R. Pier*. **53**, 791, 27-E2 (1983) (Abstr. in **274**, 922, 135-E3)
- PIETRANERA, L. The Irregular Distribution of Galaxies and the Anisotropies in the Microwave Background Photons. *C. Ceccarelli, F. Melchiorri, L. Pietranera, G. Dall'Oglio, and B. Melchiorri-Olivo*. **269**, L27, 76-A4 (1983)
- Search for Extragalactic Backgrounds in the Far-Infrared. *C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera*. **275**, L39, 148-B7 (1983)
- PIGGOTT, RICHARD G., JR. A Catalog of Hierarchical Subclustering in the Turner-Gott Groups. *Suketu P. Bhavsar and Richard G. Piggott*, Jr. **52**, 23, 9-C10 (1983) (Abstr. in **267**, 893, 50-E1)
- PILACHOWSKI, CATHERINE A. The Chemical Composition of Distant Globular Clusters: Are There Any Metal-poor Clusters? *Catherine A. Pilachowski, Gregory D. Bothun, Edward W. Olszewski, and Andrew Odell*. **273**, 187, 114-C5 (1983)
- The Chemical Composition of Stars in Globular Clusters. *Catherine A. Pilachowski, Christopher Sneden, and George Wallerstein*. **52**, 241, 12-G9 (1983) (Abstr. in **269**, 810, 75-C9)
- PIPHER, JUDITH L. Extinction to Ionized Gas at the Galactic Center. *S. P. Willner and Judith L. Pipher*. **265**, 760, 21-A13 (1983)
- PIRAN, TSVI. Stellar Collapses in the Galaxy. *John N. Bahcall and Tsvi Piran*. **267**, L77, 51-A11 (1983)
- PIRRONELLO, V. Destruction of Ice Grains in T Tauri Stars. *G. Strazzulla, V. Pirronello, and G. Foti*. **271**, 255, 90-G1 (1983)
- PISSO, V. J. Mass Loss from Rotating Magnetic Stars: Weber and Davis Re-revisited. *K. B. MacGregor and V. J. Pizzo*. **267**, 340, 43-E8 (1983)
- PIZZICHINI, G. Optical Candidates for the 1978 November 19 Gamma-Ray Burst Source. *H. Pedersen, C. Motch, M. Tarenghi, J. Danziger, G. Pizzichini, and W. H. G. Lewin*. **270**, L43, 87-A14 (1983)
- PIZZO, V. Determination of the Solar Wind Angular Momentum Flux from the Helios Data—An Observational Test of the Weber and Davis Theory. *V. Pizzo, R. Schwenn, E. Marsch, H. Rosenbauer, K.-H. Mühlhäuser, and F. M. Neubauer*. **271**, 335, 91-E14 (1983)
- PLAMBECK, R. L. Source of the High-Velocity Molecular Flow in Orion. *M. C. H. Wright, R. L. Plambeck, S. N. Vogel, P. T. P. Ho, and W. J. Welch*. **267**, L41, 45-E3 (1983)
- Positions of the SiO Masers in Orion-KL: Anisotropy on a Scale of 70 AU. *M. C. H. Wright and R. L. Plambeck*. **267**, L115, 51-D4 (1983)
- Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck*. **271**, L31, 93-C3 (1983)
- PLAMBECK, RICHARD L.  $J = 2-1$  CO Observations of Molecular Clouds with High-Velocity Gas: Evidence for Clumpy Outflows. *Richard L. Plambeck, Ronald L. Snell, and Robert B. Loren*. **266**, 321, 30-D8 (1983)
- PLAVEC, MIREK J. RW Tauri as a Weak W Serpentis Star. *Mirek J. Plavec and Jan J. Dobias*. **272**, 206, 103-C6 (1983)
- Far-Ultraviolet Emission Lines in U Cephei: Evidence for a Hot, Turbulent Circumstellar Envelope. *Mirek J. Plavec*. **275**, 251, 139-F14 (1983)
- PLUMMER, GRANT M. Laboratory Measurement of the  $J = 2 \rightarrow 3$  Rotational Transition Frequency of  $\text{HC}^{18}\text{O}^+$ . *Grant M. Plummer, Eric Herbst, and Frank C. De Lucia*. **270**, L99, 87-F7 (1983)
- PNEUMAN, G. W. Ejection of Magnetic Fields from the Sun: Acceleration of a Solar Wind Containing Diamagnetic Plasoids. *G. W. Pneuman*. **265**, 468, 17-B8 (1983)
- POGGE, R. *see* LAWRENCE, A., *et al.*
- POLAND, A. I. Simultaneous Ultraviolet Line and Hard X-Ray Bursts in the Impulsive Phase of Solar Flares. *B. E. Woodgate, R. A. Shine, A. I. Poland, and L. E. Orwig*. **265**, 530, 17-G1 (1983)
- POLLOCK, J. T. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F.*

- Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea. **274**, 101, 125-A9 (1983)
- POLLOCK, JOSEPH T. Low Frequency Asymptotic Spectra of Multiple, Decelerating Adiabatic Bursts. *Peter D. Usher, Ke-Liang Huang, Kenneth J. Mitchell, and Joseph T. Pollock.* **264**, 451, 7-C2 (1983)
- POMRANING, G. C. Flux-Limited Diffusion with Relativistic Corrections. *G. C. Pomraning.* **266**, 841, 37-E4 (1983)
- POSTMAN, MARC. First-ranked Galaxies in Groups. *Margaret J. Geller and Marc Postman.* **274**, 31, 124-C8 (1983)
- PRADHAN, A. K. Radiative Recombination of the Ground State of Lithium-like Ions. *A. K. Pradhan.* **270**, 339, 80-E8 (1983)
- PRASAD, SHEO S. Dependence of Interstellar Depletion on Hydrogen Column Density: Possibilities and Implications. *Shankar P. Tarafdar, Sheo S. Prasad, and Wesley T. Huntress, Jr.* **267**, 156, 41-E13 (1983)
- UV Radiation Field inside Dense Clouds: Its Possible Existence and Chemical Implications. *Sheo S. Prasad and Shankar P. Tarafdar.* **267**, 603, 47-D5 (1983)
- PRAVDO, S. H. IUE Observations of E1405-451: A New AM Herculis Type Cataclysmic Variable. *J. A. Nousek and S. H. Pravdo.* **266**, L39, 32-C8 (1983)
- PRAVDO, STEVEN H. The Broad-Band X-Ray Spectrum of Cygnus X-2. *Steven H. Pravdo.* **270**, 239, 79-E2 (1983)
- X-Rays and Rotation among Post-T Tauri G Stars in Orion Ic. *Myron A. Smith, Steven H. Pravdo, and William H.-M. Ku.* **272**, 163, 102-G2 (1983)
- PREDMORE, READ. Ionized Gas in Active Molecular Cloud Cores. *John Bally and Read Predmore.* **265**, 778, 21-C3 (1983)
- Radio Images of the Bipolar H II Region S106. *John Bally, Ronald L. Snell, and Read Predmore.* **272**, 154, 102-F7 (1983)
- PRESS, WILLIAM H. Multiscale Model Equations for Turbulent Convection and Convective Overshoot. *Philip S. Marcus, William H. Press, and Saul A. Teukolsky.* **267**, 795, 49-D12 (1983)
- PRESTON, GEORGE W. Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Baliunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning.* **275**, 752, 145-F7 (1983)
- PRESTON, ROBERT A. VLBI Observations of the Nucleus of Centaurus A. *Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **266**, L93, 39-B8 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. *Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **268**, L23, 57-B13 (1983)
- A Statistical VLBI Study of Milli-Arcsecond Cores in Extragalactic Radio Sources. *Robert A. Preston, David D. Morabito, and David L. Jauncey.* **269**, 387, 70-F8 (1983)
- PRICE, JILL S. Photoelectric UVB Surface Photometry of NGC 205. *Jill S. Price and Gary L. Grasdale.* **275**, 559, 143-F1 (1983)
- PRICE, RICHARD. Formation of Population III Stars and Galaxies with Primordial Planetary-Mass Black Holes. *Katherine Freese, Richard Price, and David N. Schramm.* **275**, 405, 142-A5 (1983)
- PRICE, RICHARD H. Comptonization Effects in Spherical Accretion onto Black Holes. *James R. Ipser and Richard H. Price.* **267**, 371, 43-G11 (1983)
- PRICE, STEPHAN D. The Brighter 94 Micron Sources Observed by the Far-Infrared Sky Survey Experiment. *Stephan D. Price, K. Shivanandan, Thomas L. Murdock, and Phillip F. Bowers.* **275**, 125, 138-D8 (1983)
- PRIEDHORSKY, W. C. Evidence for an ~300 Day Period in Cygnus X-1. *W. C. Priedhorsky, J. Terrell, and S. S. Holt.* **270**, 233, 79-D10 (1983)
- Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. *J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radostitz, W. C. Priedhorsky, J. Terrell, and E. N. Walker.* **271**, L65, 100-B8 (1983)
- Long-Term X-Ray Observations of Centaurus X-3. *GX 301-2 (4U 1223-62), GX 304-1 (4U 1258-61), and 4U 1145-61.* *W. C. Priedhorsky and J. Terrell.* **273**, 709, 121-C14 (1983)
- PRIEST, E. R. The Heating of Postflare Loops. *P. J. Cargill and E. R. Priest.* **266**, 383, 31-B1 (1983)
- The Structure of Twisted Magnetic Flux Tubes. *P. K. Browning and E. R. Priest.* **266**, 848, 37-E11 (1983)
- PRIMINI, F. High-Energy X-Ray Observations of Vela X-1. *M. Bautz, S. Howe, A. Gorecki, F. Lang, A. Levine, F. Primini, and W. H. G. Lewin.* **266**, 794, 37-A8 (1983)
- PRIMINI, F. A. HEAO 1 High-Energy X-Ray Observations of Centaurus X-3. *S. K. Howe, F. A. Primini, M. W. Bautz, F. L. Lang, A. M. Levine, and W. H. G. Lewin.* **272**, 678, 109-B12 (1983)
- PROBST, RONALD G. An Infrared Search for Very Low Mass Stars: The Luminosity Function. *Ronald G. Probst.* **274**, 237, 126-D5 (1983)
- LHS 2924: A Uniquely Cool Low-Luminosity Star with a Peculiar Energy Distribution. *Ronald G. Probst and James Liebert.* **274**, 245, 126-D13 (1983)
- An Infrared Search for Very Low Mass Stars: JHK Photometry and Results for Composite Systems. *Ronald G. Probst.* **53**, 335, 21-D2 (1983) (Abstr. in **272**, 785, 110-C10)
- PROTHEROE, R. J. On the Origin of Relativistic Particles and Gamma-Rays in Quasars. *R. J. Protheroe and D. Kazanas.* **265**, 620, 19-D1 (1983)
- Implications of HEAO 3 Data for the Acceleration and Propagation of Galactic Cosmic Rays. *J. F. Ormes and R. J. Protheroe.* **272**, 756, 110-A8 (1983)
- PRYOR, CARLTON. Can Secondary Infall Produce Flat Rotation Curves? *Carlton Pryor and Myron Lecar.* **269**, 513, 72-A14 (1983)
- PUDRITZ, R. E. Centrifugally Driven Winds from Contracting Molecular Disks. *R. E. Pudritz and C. A. Norman.* **274**, 677, 132-G4 (1983)
- PUETTER, R. C. Theoretical Quasar Emission-Line Profiles. I. Curve-of-Growth Effects on Observed Profiles. *E. N. Hubbard and R. C. Puetter.* **265**, 35, 12-D10 (1983)
- Theoretical Quasar Emission-Line Profiles. II. Effects of Source Function Variation and Total Thickness. *R. C. Puetter and E. N. Hubbard.* **273**, 36, 112-E2 (1983)
- PUMPHREY, WILLIAM A. Simulation Models for the Evolution of Cloud Systems. I. Introduction and Preliminary Simulations. *William A. Pumphrey and John M. Scalo.* **269**, 531, 72-C4 (1983)
- PURGATHOFER, A. Radial Velocities of Planetary Nebulae. *Stephen E. Schneider, Yervant Terzian, A. Purgathofer, and M. Perinotto.* **52**, 399, 15-G5 (1983) (Abstr. in **270**, 779, 86-E6)
- PURTON, C. R. The Effects of Mass and Metallicity upon Planetary Nebula Formation. *K. A. Papp, C. R. Purton, and S. Kwok.* **268**, 145, 53-E9 (1983)
- PUSCHELL, J. J. Simultaneous Visual-Infrared Polarimetry of QSOs. *J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti.* **265**, 625, 19-D6 (1983)
- Millimeter-Wavelength Outbursts in the Elliptical Galaxy NGC 1052. *D. S. Heeschen and J. J. Puschell.* **267**, L11, 45-C1 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. *R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek.* **268**, 68, 52-F3 (1983)

- The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski.* **274**, 62, 124-E11 (1983)
- PYLE, K. R. The Anomalous Helium Component in the Heliosphere: The 1965 versus the 1972-1977 Solar Minimum. *M. Garcia-Munoz, K. R. Pyle, and J. A. Simpson.* **274**, L93, 136-D11 (1983)
- A Quantitative Test of Solar Modulation Theory: The Proton, Helium, and Electron Spectra from 1965 through 1979. *P. Evenson, M. Garcia-Munoz, P. Meyer, K. R. Pyle, and J. A. Simpson.* **275**, L15, 141-F14 (1983)
- PYLE, K. ROGER. Protons from the Decay of Solar Flare Neutrons. *Paul Evenson, Peter Meyer, and K. Roger Pyle.* **274**, 875, 135-A1 (1983)
- PYPER, DIANE M. Spectrophotometry of B, A, and F Stars. III. *Saul J. Adelman and Diane M. Pyper.* **266**, 732, 36-C10 (1983)
- QUIGLEY, ROB. Detection of Flarelike Events and Their Relationship to Presumed Spot Regions of V471 Tauri: A Solar-Stellar Connection. *Arthur Young, A. Klimke, John L. Africano, Rob Quigley, Richard R. Radick, and Dave Van Buren.* **267**, 655, 48-A3 (1983)
- QUINN, P. J. Shell Structure in NGC 5128. *D. F. Malin, P. J. Quinn, and J. A. Graham.* **272**, L5, 105-D6 (1983)
- RADICK, RICHARD R. Detection of Flarelike Events and Their Relationship to Presumed Spot Regions of V471 Tauri: A Solar-Stellar Connection. *Arthur Young, A. Klimke, John L. Africano, Rob Quigley, Richard R. Radick, and Dave Van Buren.* **267**, 655, 48-A3 (1983)
- RADOSTITZ, J. V. Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. *J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radostitz, W. C. Friedhorsky, J. Terrell, and E. N. Walker.* **271**, L65, 100-B8 (1983)
- Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low.* **273**, 58, 112-F10 (1983)
- RALLIS, ANDREW D. X-Ray Observations of M33 with the High Resolution Imager on the Einstein Observatory. *Thomas H. Markert and Andrew D. Rallis.* **275**, 571, 143-F14 (1983)
- RAMATY, R. Implications of High-Energy Neutron Observations from Solar Flares. *R. Ramaty, R. J. Murphy, B. Kozlovsky, and R. E. Lingenfelter.* **273**, L41, 117-D12 (1983)
- RANK, D. M. Observations of NGC 7027 from 5.2 to 7.5 Microns: The Detection of Ni II and Additional Dust Features. *J. D. Bregman, H. L. Dinerstein, J. H. Goebel, D. F. Lester, F. C. Witteborn, and D. M. Rank.* **274**, 666, 132-F7 (1983)
- RANK, DAVID M. An Ionization Gradient across the Front of M17 SW. *Daniel F. Lester, Harriet L. Dinerstein, David M. Rank, and Diane H. Wooden.* **275**, 130, 138-D13 (1983)
- RANKIN, JOANNA M. Toward an Empirical Theory of Pulsar Emission. I. Morphological Taxonomy. *Joanna M. Rankin.* **274**, 333, 127-D6 (1983)
- Toward an Empirical Theory of Pulsar Emission. II. On the Spectral Behavior of Component Width. *Joanna M. Rankin.* **274**, 359, 127-F4 (1983)
- RAO, A. PRAMESH. *see* LAWRENCE, A., *et al*
- RAPPAPOORT, S. Discovery of 13.5 s X-Ray Pulsations from LMC X-4 and an Orbital Determination. *R. L. Kelley, J. G. Jernigan, A. Levine, L. D. Petro, and S. Rappaport.* **264**, 568, 8-D13 (1983)
- Orbital Period Changes in Centaurus X-3. *R. L. Kelley, S. Rappaport, G. W. Clark, and L. D. Petro.* **268**, 790, 61-F12 (1983)
- On the Evolutionary Status of Bright, Low-Mass X-Ray Sources. *R. F. Webbink, S. Rappaport, and G. J. Savonije.* **270**, 678, 85-E1 (1983)
- The Breakdown of Nuclear Quasi-Equilibrium in Highly Compact Binaries and the Origin of the 2-3 Hour Gap in the Orbital Period Distribution of Cataclysmic Variables. *P. C. Joss and S. Rappaport.* **270**, L73, 87-D3 (1983)
- Discovery of 9.3 s X-Ray Pulsations from 2S 1553-542 and a Determination of the Orbit. *R. L. Kelley, S. Rappaport, and S. Ayasli.* **274**, 765, 133-F8 (1983)
- A New Technique for Calculations of Binary Stellar Evolution, with Application to Magnetic Braking. *S. Rappaport, F. Verbunt, and P. C. Joss.* **275**, 713, 145-C10 (1983)
- RATCLIFF, S. Interstellar Absorption Lines in the Spectrum of 3C 273. *D. G. York, C. C. Wu, S. Ratcliff, J. C. Blades, L. L. Cowie, and D. C. Morton.* **274**, 136, 125-D2 (1983)
- RAYMOND, J. C. The Structure and Emission Spectrum of a Nonradiative Shock Wave in the Cygnus Loop. *J. C. Raymond, W. P. Blair, R. A. Fesen, and T. R. Gull.* **275**, 636, 144-E3 (1983)
- White Dwarfs and the Interstellar Medium. *A. K. Dupree and J. C. Raymond.* **275**, L71, 148-D10 (1983)
- READHEAD, A. C. S. Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. *A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney.* **265**, 107, 13-C2 (1983)
- REAVES, GIBSON. A Catalog of Dwarf-Galaxies in Virgo. *Gibson Reaves.* **53**, 375, 21-F12 (1983) (Abstr. in **272**, 786, 110-C11)
- REICHERT, G. Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. *K. O. Mason, J. Middle-ditch, F. A. Córdoba, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer.* **264**, 575, 8-E6 (1983)
- REICHLEY, P. E. JPL Pulsar Timing Observations. II. Geocentric Arrival Times. *G. S. Downs and P. E. Reichley.* **53**, 169, 18-F2 (1983) (Abstr. in **271**, 894, 99-C2)
- REID, M. J. Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck.* **271**, L31, 93-C3 (1983)
- REITSEMA, HAROLD J. CCD Photometry of the BL Lacertae Object 1400+162 and the Associated Group of Galaxies. *Donna Weistrop, David B. Shaffer, Harold J. Reitsema, and Bradford A. Smith.* **271**, 471, 94-E11 (1983)
- REMILLARD, R. H0323+022: A Puzzling High-Latitude X-Ray/Optical/Radio Source. *R. Doxsey, H. Bradt, J. McClintock, L. Petro, R. Remillard, G. Ricker, D. Schwartz, and K. Wood.* **264**, L43, 11-A14 (1983)
- Discovery of a Massive Unseen Star in LMC X-3. *A. P. Cowley, D. Crampton, J. B. Hutchings, R. Remillard, and J. E. Penfold.* **272**, 118, 102-C13 (1983)
- REMILLARD, R. A. The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae). *G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen.* **266**, 806, 37-B10 (1983)
- Periodic Variability of the X-Ray Nova A0620-00 in Quiescence. *J. E. McClintock, L. D. Petro, R. A. Remillard, and G. R. Ricker.* **266**, L27, 32-B12 (1983)
- RENZINI, ALVIO. On the Evolution of Those Nuclei of Planetary Nebulae That Experience a Final Helium Shell Flash. *Icko Iben, Jr., James B. Kaler, James W. Truran, and Alvio Renzini.* **264**, 605, 9-A1 (1983)
- REPPIN, C. Gamma-Ray Observational Constraints on the Origin of the Optical Continuum Emission from the White-Light Flare of 1980 July 1. *J. M. Ryan, E. L. Chupp, D. J. Forrest, S. M. Matz, E. Rieger, C. Reppin, G. Kanbach, and G. H.*

- Share. **272**, L61, 111-B8 (1983)
- REYNOLDS, R. J. Interstellar H $\alpha$  Emission along the Galactic Equator. *R. J. Reynolds*. **268**, 698, 60-G1 (1983)
- RHODES, EDWARD J., JR. Testing Solar Models with Global Solar Oscillations in the 5-Minute Band. *Roger K. Ulrich and Edward J. Rhodes, Jr.* **265**, 551, 18-A10 (1983)
- RICCHIAZZI, PAUL J. A Static Model of Chromospheric Heating in Solar Flares. *Paul J. Ricchiazzi and Richard C. Canfield*. **272**, 739, 109-G5 (1983)
- RICH, R. M. Metal Content of K Giants in the Nuclear Bulge of the Galaxy. *A. E. Whitford and R. M. Rich*. **274**, 723, 133-C8 (1983)
- RICHER, HARVEY B. Carbon Stars in Local Group Galaxies. *Harvey B. Richer and Bengt E. Westerlund*. **264**, 114, 2-B10 (1983)
- An Infrared Search for Luminous Stars in the Bar West Field of the Large Magellanic Cloud. *Jay A. Frogel and Harvey B. Richer*. **275**, 84, 138-A1 (1983)
- RICHSTONE, DOUGLAS O. The Evolution of Clusters of Galaxies. I. Very Rich Clusters. *Douglas O. Richstone and Eliot M. Malumuth*. **268**, 30, 52-C7 (1983)
- High-Velocity Absorbing Cloudlets as Potential Contributors to Observed Quasar Continua. *Ronald G. Eastman, Gordon M. MacAlpine, and Douglas O. Richstone*. **275**, 53, 137-E3 (1983)
- RICHTER, ACHIM. Cross Section for the Reaction  $^{12}\text{C}(e,p)^{11}\text{B}$  and Its Relevance to the Formation of  $^{11}\text{B}$  in Active Galaxies. *Dieter H. H. Hoffmann, Achim Richter, Gerhard Schrieder, and Klaus Seegebarth*. **271**, 398, 92-C8 (1983)
- RICKARD, L. J. The Variation of Dust Temperatures in Maffei 2. *L. J. Rickard and P. M. Harvey*. **268**, L7, 57-A8 (1983)
- RICKER, G. H0323+022: A Puzzling High-Latitude X-Ray/Optical/Radio Source. *R. Doxsey, H. Bradt, J. McClintock, L. Petro, R. Remillard, G. Ricker, D. Schwartz, and K. Wood*. **264**, L43, 11-A14 (1983)
- RICKER, G. R. Periodic Variability of the X-Ray Nova A0620-00 in Quiescence. *J. E. McClintock, L. D. Petro, R. A. Remillard, and G. R. Ricker*. **266**, L27, 32-B12 (1983)
- RIDGWAY, S. T. The Detection of H $_2$  in Cool Carbon Stars. *H. R. Johnson, J. H. Goebel, D. Goorvitch, and S. T. Ridgway*. **270**, L63, 87-C9 (1983)
- The Circumstellar and Nebular Environment of the Becklin-Neugebauer Object:  $\lambda = 2-5$  Micron Spectroscopy. *N. Scoville, S. G. Kleinmann, D. N. B. Hall, and S. T. Ridgway*. **275**, 201, 139-C3 (1983)
- RIEGER, E. Gamma-Ray Observational Constraints on the Origin of the Optical Continuum Emission from the White-Light Flare of 1980 July 1. *J. M. Ryan, E. L. Chupp, D. J. Forrest, S. M. Matz, E. Rieger, C. Reppin, G. Kanbach, and G. H. Share*. **272**, L61, 111-B8 (1983)
- RIEGLER, G. R. HEAO A-2 Soft X-Ray Source Catalog. *J. J. Nugent, K. A. Jensen, J. A. Nousek, G. P. Garmire, K. O. Mason, F. M. Walter, C. S. Bowyer, R. A. Stern, and G. R. Riegler*. **51**, 1, 1-A2 (1983) (Abstr. in **263**, 1007, 142-F8)
- RIEKE, G. H. An Infrared and Optical Investigation of Galactic Nuclei with Compact Radio Sources. *T. M. Heckman, M. J. Lebofsky, G. H. Rieke, and W. van Breugel*. **272**, 400, 106-B8 (1983)
- RIVOLLO, A. R. Nonlinear Evolution of Superclusters. *A. R. Rivolo and A. Yahil*. **274**, 474, 130-C8 (1983)
- ROBERGE, W. G. Magnetohydrodynamic Shock Waves in Molecular Clouds. *B. T. Draine, W. G. Roberge, and A. Dalgarno*. **264**, 485, 7-E11 (1983)
- The Spherical Harmonics Solution for the Radiation Field in Plane-parallel Clouds with Embedded Sources. *W. G. Roberge*. **275**, 292, 140-B14 (1983)
- ROBERTSON, J. GORDON. Common Absorption Systems in the Spectra of the QSO Pair Q0307-195A. *B. Peter A. Shaver and J. Gordon Robertson*. **268**, L57, 63-D4 (1983)
- ROBINSON, E. L. Pulsation Properties of DA White Dwarfs: Radial Mode Instabilities. *H. Saio, D. E. Winget, and E. L. Robinson*. **265**, 982, 23-E2 (1983)
- The Light Curve of the ZZ Ceti Star G226-29. *S. O. Kepler, E. L. Robinson, and R. E. Nather*. **271**, 744, 97-E11 (1983)
- Cessation of the 63 Second Periodicity in the Light Curve of V533 Herculis. *E. L. Robinson and R. E. Nather*. **273**, 255, 115-A13 (1983)
- ROBINSON, G. The Spectral and Spatial Distribution of Radiation from Eta Carinae. III. A High-Resolution 2.2 Micron Map and Morphological Considerations of the Evolutionary Status. *R. M. Mitchell, G. Robinson, A. R. Hyland, and T. J. Jones*. **271**, 133, 89-D5 (1983)
- ROBSON, E. I. Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low*. **273**, 58, 112-F10 (1983)
- ROCHE, P. F. The Unique Cometary Nebula Parsamian 13. *Martin Cohen, D. K. Aikin, P. F. Roche, and P. M. Williams*. **273**, 624, 120-D2 (1983)
- RODDIER, C. High Angular Resolution Observations of Alpha Orionis with a Rotation Shearing Interferometer. *C. Roddier and F. Roddier*. **270**, L23, 81-B9 (1983)
- RODDIER, F. High Angular Resolution Observations of Alpha Orionis with a Rotation Shearing Interferometer. *C. Roddier and F. Roddier*. **270**, L23, 81-B9 (1983)
- RODGERS, A. W. Stellar Chromospheres: H $\alpha$  and Ca II K Profiles. *D. M. Zarro and A. W. Rodgers*. **53**, 815, 27-G1 (1983) (Abstr. in **274**, 922, 135-E3)
- RODRIGUES, R. Analysis of the Konus Catalog of Gamma-Ray Bursts with the Thermal Synchrotron Model. *E. P. Liang, T. E. Jernigan, and R. Rodrigues*. **271**, 766, 97-G5 (1983)
- RODRIGUEZ, L. F. Water-Vapor Masers Located near Herbig-Haro Objects. *A. D. Haschick, J. M. Moran, L. F. Rodriguez, and P. T. P. Ho*. **265**, 281, 15-B13 (1983)
- Stellar Winds and Molecular Clouds: T Tauri Stars. *Nuria Calvet, Jorge Cantó, and L. F. Rodriguez*. **268**, 739, 61-C3 (1983)
- RODRIGUEZ, LUIS F. The Galactic Gradient in Electron Temperature from Observations of Low-Density H II Regions. *Guido Garay and Luis F. Rodriguez*. **266**, 263, 29-G1 (1983)
- Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? *José M. Torrelles, Luis F. Rodriguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho*. **274**, 214, 126-B10 (1983)
- ROESLER, F. L. The Filaments of NGC 1275: A Collision between a Galaxy and an Accretion Flow? *E. M. Hu, L. L. Cowie, P. Kaaret, E. B. Jenkins, D. G. York, and F. L. Roesler*. **275**, L27, 148-A4 (1983)
- ROGERS, C. The Circumstellar Dust of Mu Cephei. *C. Rogers, P. G. Martin, and Dennis R. Crabtree*. **272**, 175, 103-A1 (1983)
- ROMANI, R. W. An Upper Limit on the Stochastic Background of Ultralow-Frequency Gravitational Waves. *R. W. Romani and J. H. Taylor*. **265**, L35, 26-A4 (1983)
- ROMANISHIN, W. A Study of Low Surface Brightness Spiral Galaxies. II. Optical Surface Photometry, Infrared Photometry, and H II Region Spectrophotometry. *W. Romanishin, K. M. Strom, and S. E. Strom*. **53**, 105, 18-A10 (1983) (Abstr. in **271**, 892, 99-B14)
- ROMNEY, J. D. Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. *A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney*. **265**, 107, 13-C2 (1983)
- ROSE, JAMES A. Optical Spectrophotometry of the Nuclear Region of M51. II. Further Evidence for Nuclear Activity. *James A. Rose and Gerald Cecil*. **266**, 531, 34-B2 (1983)
- ROSENBAUER, H. Determination of the Solar Wind Angular Momentum Flux from the Helios Data—An Observational Test of the Weber and Davis Theory. *V. Pizzo, R. Schwenn, E.*



- Marsch, H. Rosenbauer, K.-H. Mühlhäuser, and F. M. Neubauer. **271**, 335, 91-E14 (1983)
- ROSENTHAL, ANN J. Nova Shells. Judith G. Cohen and Ann J. Rosenthal. **268**, 689, 60-F5 (1983)
- ROSMAN, K. J. R. *r*-Process Abundances near the Mass 130 Peak. J. R. De Laeter and K. J. R. Rosman. **270**, 746, 86-C1 (1983)
- ROSNER, R. Doubly Diffusive Magnetic Buoyancy Instability in the Solar Interior. J. H. M. M. Schmitt and R. Rosner. **265**, 901, 22-F4 (1983)
- Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner. **270**, 270, 79-G7 (1983)
- Einstein Observations of X-Ray Emission from A Stars. L. Golub, F. R. Harnden, Jr., C. W. Maxson, R. Rosner, G. S. Vaiana, Webster Cash, Jr., and Theodore P. Snow, Jr. **271**, 264, 90-G11 (1983)
- ROSNER, ROBERT. Thermal Conduction and Heating by Non-thermal Electrons in the X-Ray Halo of M87. Wallace H. Tucker and Robert Rosner. **267**, 547, 46-G3 (1983)
- ROTH, BERNARD D. The Evolution of Voids in the Expanding Universe. Mark A. Hausman, Donald W. Olson, and Bernard D. Roth. **270**, 351, 82-A5 (1983)
- ROTHSCHILD, R. E. 2-165 keV Observations of Active Galaxies and the Diffuse Background. R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson. **269**, 423, 71-B2 (1983)
- Long-Term, Hard X-Ray Observations of Scorpius X-1 from HEAO 1. Y. Soong and R. E. Rothschild. **274**, 327, 127-C14 (1983)
- Observations of a Hard X-Ray Component in the Spectrum of Nova Ophiuchi. C. K. Wilson and R. E. Rothschild. **274**, 717, 133-C2 (1983)
- ROTTMAN, G. J. Outflow from the Sun's Polar Corona. F. Q. Orrall, G. J. Rottman, and J. A. Klimchuk. **266**, L65, 32-E3 (1983)
- ROUEFF, E. Resonant and Nonresonant Processes in the Formation of CH<sup>+</sup> by Radiative Association. M. M. Graff, J. T. Moseley, and E. Roueff. **269**, 796, 75-B9 (1983)
- ROUSE, CARL A. Comments on the Planck-Larkin Partition Function. Carl A. Rouse. **272**, 377, 105-B4 (1983)
- ROUSSEL-DUPRÉ, D. H I Lyman-Alpha in the Sun: The Effects of Partial Redistribution in the Line Wings. D. Roussel-Dupré. **272**, 723, 109-F3 (1983)
- Skylab Observations of the Solar C I Multiplets at  $\lambda 1560$  and  $\lambda 1657$ . D. Roussel-Dupré. **275**, 892, 147-C7 (1983)
- RUBIN, ROBERT H. Modeling of G333.6-0.2 as a Spherical H II Region. Robert H. Rubin, David J. Hollenbach, and Edwin F. Erickson. **265**, 239, 14-F13 (1983)
- The Effect of Heavy Element Opacity on the Structure of H II Regions. Robert H. Rubin. **274**, 671, 132-F12 (1983)
- RUBIN, VERA C. The Noninteracting Spiral Pair, NGC 450/UGC 807. Vera C. Rubin and W. Kent Ford, Jr. **271**, 556, 95-E5 (1983)
- RUDNICK, L. Optical and Radio Structure of the Quasar PKS 0812+02. S. Wyckoff, K. Johnston, F. Ghigo, L. Rudnick, P. Wehinger, and A. Boksenberg. **265**, 43, 12-E4 (1983)
- Simultaneous Visual-Infrared Polarimetry of QSOs. J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti. **265**, 625, 19-D6 (1983)
- RUDY, RICHARD J. The Strength of Paschen-Alpha in the Seyfert 1.9 Galaxy V Zwicky 317. Richard J. Rudy and S. P. Willner. **267**, L69, 51-A4 (1983)
- Optical Polarimetry of Broad-Line Radio Galaxies. Richard J. Rudy, G. D. Schmidt, H. S. Stockman, and Richard L. Moore. **271**, 59, 88-E8 (1983)
- Near-Infrared Spectrophotometry of Planetary Nebulae. P. D. LeVan and Richard J. Rudy. **272**, 137, 102-E4 (1983)
- RUFFINI, REMO. Equilibrium Configurations of Neutron Stars and the Parametrized Post-Newtonian Metric Theories of Gravitation. Ignazio Ciufolini and Remo Ruffini. **275**, 867, 147-A10 (1983)
- RUIZ, MARÍA TERESA. PL 1547.3-5612: A Pure Nitrogen Ring Nebula. María Teresa Ruiz. **268**, L103, 63-G4 (1983)
- RUMSTAY, K. S. H II Regions and Star Formation in M83 and M33. K. S. Rumstay and Michele Kaufman. **274**, 611, 132-B3 (1983)
- RUSSELL, R. W. Observations of the Extinction and Excitation of the Molecular Hydrogen Emission in Orion. S. Beckwith, Neal J. Evans II, I. Gatley, G. Gull, and R. W. Russell. **264**, 152, 2-E6 (1983)
- RUSSELL, RAY W. The 157 Micron [C II] Emission from NGC 2024: Core and Halo Components. Noel L. Kurtz, Scott D. Smyers, Ray W. Russell, Martin Harwit, and Gary Melnick. **264**, 538, 8-B11 (1983)
- RUST, D. M. Observations of H $\alpha$  and Microwave Brightening Caused by a Distant Solar Flare. M. R. Kundu, D. M. Rust, and M. Bobrowsky. **265**, 1084, 24-E9 (1983)
- RYAN, J. M. Gamma-Ray Observational Constraints on the Origin of the Optical Continuum Emission from the White-Light Flare of 1980 July 1. J. M. Ryan, E. L. Chupp, D. J. Forrest, S. M. Matz, E. Rieger, C. Reppin, G. Kanbach, and G. H. Share. **272**, L61, 111-B8 (1983)
- RYBICKI, GEORGE B. Second-Order Escape Probability Approximations in Radiative Transfer: Erratum. D. G. Hummer and George B. Rybicki. **271**, 888, 99-B10 (1983) (Orig. paper in **263**, 925, 141-G7)
- The Specific Luminosity of a Three-dimensional Medium in Terms of the Escape Probability. George B. Rybicki and D. G. Hummer. **274**, 380, 127-G11 (1983)
- RYDGREN, A. E. Periodic Light Variations in Four Pre-Main-Sequence K Stars. A. E. Rydgren and F. J. Vrba. **267**, 191, 42-A8 (1983)
- RYPMA, ROGER L. Effect of Molecules and Grains on Rosseland Mean Opacities. David R. Alexander, Hollis R. Johnson, and Roger L. Rypma. **272**, 773, 110-B11 (1983)
- SABBADIN, F. A Newly Discovered Nearby Planetary Nebula of Old Age. R. Weinberger, J. Dengel, H. Hartl, and F. Sabbadin. **265**, 249, 14-G9 (1983)
- SACCO, B. Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills. **274**, 231, 126-C13 (1983)
- SADAKANE, KOZO. The Resonance Lines of Aluminum in IUE Spectra of B-Type Chemically Peculiar Stars. Kozo Sadakane, Masahide Takada, and Jun Jugaku. **274**, 261, 126-F2 (1983)
- SAHAL, S. Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado. **265**, 1066, 24-D5 (1983)
- SAIO, H. Pulsation Properties of DA White Dwarfs: Radial Mode Instabilities. H. Saio, D. E. Winget, and E. L. Robinson. **265**, 982, 23-E2 (1983)
- SAIO, HIDEYUKI. Pulsational Constraints on the Mass and Luminosity of R Coronae Borealis Stars. Hideyuki Saio and J. Craig Wheeler. **272**, L25, 105-F3 (1983)
- SALPETER, E. E. Effects of Environment on Neutral Hydrogen Distribution for Disk Galaxies in the Virgo Cluster Area. C. Giovanardi, George Helou, E. E. Salpeter, and Nathan Krumm. **267**, 35, 40-C13 (1983)
- High-Velocity Outflow Sources in Molecular Clouds: The Case for Low-Mass Stars. S. Beckwith, A. Natta, and E. E. Salpeter. **267**, 596, 47-C12 (1983)
- Spherical Simulations of Holes and Honeycombs in Fried-

- mann Universes. G. L. Hoffman, E. E. Salpeter, and I. Wasserman. **268**, 527, 58-F13 (1983)
- Dwarf Elliptical Galaxies. Humberto Gerola, Paolo Carnevali, and E. E. Salpeter. **268**, L75, 63-E6 (1983)
- The Collapse and Violent Relaxation of N-Body Systems: Mass Segregation and the Secondary Maximum. R. T. Farouki, G. L. Hoffman, and E. E. Salpeter. **271**, 11, 88-B2 (1983)
- Primordial Star Formation: The Role of Molecular Hydrogen. Francesco Palla, E. E. Salpeter, and Steven W. Stahler. **271**, 632, 96-D6 (1983)
- Interpretation of Neutral Hydrogen Spin Temperature Measurements. H. E. Payne, E. E. Salpeter, and Yervant Terzian. **272**, 540, 107-F9 (1983)
- Line Radiation from a Hot, Optically Thin Plasma: Collision Strengths and Emissivities. T. J. Gaetz and E. E. Salpeter. **52**, 155, 11-D9 (1983) (Abstr. in **268**, 906, 63-A9)
- SALPETER, EDWIN E. Discovery of a Large Intergalactic H I Cloud in the M96 Group. Stephen E. Schneider, George Helou, Edwin E. Salpeter, and Yervant Terzian. **273**, L1, 117-B2 (1983)
- SALVATI, M. The Optical Luminosity of Very Fast Pulsars. F. Pacini and M. Salvati. **274**, 369, 127-F14 (1983)
- SAMORSKI, M. Detection of  $2 \times 10^{15}$  to  $2 \times 10^{16}$  eV Gamma-Rays from Cygnus X-3. M. Samorski and W. Stamm. **268**, L17, 57-B8 (1983)
- SANCHEZ MAGRO, C. see LAWRENCE, A., et al.
- SANCISI, R. The H I Distribution in an Extremely Faint Dwarf Irregular Galaxy M81 dW. W. L. W. Sargent, R. Sancisi, and K. Y. Lo. **265**, 711, 20-D14 (1983)
- SANDAGE, ALLAN. Rotational Velocities and Central Velocity Dispersions for a Sample of S0 Galaxies. Alan Dressler and Allan Sandage. **265**, 664, 19-G6 (1983)
- The Distance to M33 Based on a New Study of Its Cepheids. Allan Sandage and George Carlson. **267**, L25, 45-C14 (1983)
- SANDERS, D. B. CO Emission and the Optical Disk in the Giant Sc Galaxy M101. P. M. Solomon, J. Barrett, D. B. Sanders, and R. de Zafra. **266**, L103, 39-C3 (1983)
- CO Emission in the Outer Galaxy between Longitudes  $50^\circ$  and  $72^\circ$ . P. M. Solomon, A. A. Stark, and D. B. Sanders. **267**, L29, 45-D6 (1983)
- SANDERS, ROBERT H. The Reconfinement of Jets. Robert H. Sanders. **266**, 73, 27-F8 (1983)
- SANDERS, W. T. Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers. **268**, 205, 54-B14 (1983)
- The Soft X-Ray Diffuse Background. D. McCammon, D. N. Burrows, W. T. Sanders, and W. L. Kraushaar. **269**, 107, 66-B4 (1983)
- SANDFORD, MAXWELL T., II. Star Formation within OB Subgroups: Implosion by Multiple Sources. Richard I. Klein, Maxwell T. Sandford II, and Rodney W. Whitaker. **271**, L69, 100-B12 (1983)
- SANDKVIST, AA. Molecular Clouds on the Threshold of Star Formation: The Radial Density Profile of the Cores of the Rho Ophiuchi and R Coronae Australis Clouds. Robert B. Loren, Aa. Sandkvist, and A. Wootten. **270**, 620, 84-G9 (1983)
- SANDULEAK, N. The Extreme LMC Supergiant HD 38489: An Optical and Ultraviolet Study. Steven N. Shore and N. Sanduleak. **273**, 177, 114-B8 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- The Case Low-Dispersion Northern Sky Survey. I. Peter Pesch and N. Sanduleak. **51**, 171, 3-D1 (1983) (Abstr. in **263**, 1006, 142-F7)
- SARACENO, P. The Near-Infrared Spectrum of the Herbig Ae-Be Stars. D. Lorenzetti, P. Saraceno, and F. Strafella. **264**, 554, 8-C13 (1983)
- SARAZIN, CRAIG L. A Simple Theory of How Spiral Galaxies Acquire Their Principal Global Properties. David Burstein and Craig L. Sarazin. **264**, 427, 7-A6 (1983)
- Accretion-driven Star Formation in Central Dominant Galaxies in X-Ray Clusters. Craig L. Sarazin and Robert W. O'Connell. **268**, 552, 59-B2 (1983)
- High-Velocity Iron Absorption Lines in Supernova Remnant 1006. Chi-Chao Wu, Marvin Leventhal, Craig L. Sarazin, and Theodore R. Gull. **269**, L5, 69-A7 (1983)
- Deceleration of Grand Unified Theory Monopoles in a Plasma. Andrew J. S. Hamilton and Craig L. Sarazin. **274**, 399, 128-B2 (1983)
- X-Ray Line Emission from Supernova Remnants. I. Models for Adiabatic Remnants. Andrew J. S. Hamilton, Craig L. Sarazin, and Roger A. Chevalier. **51**, 115, 2-E1 (1983) (Abstr. in **263**, 1005, 142-F6)
- Radio Recombination Lines from Quasars. I. Level Populations of Hydrogenic Ions in a Strong, Nonthermal Radiation Field. E. James Wadiak, Craig L. Sarazin, and Robert L. Brown. **53**, 351, 21-E3 (1983) (Abstr. in **272**, 785, 110-C10)
- SARGENT, ANNEILA. The Structure of Bright-rimmed Molecular Clouds. Alwyn Wootten, Anneila Sargent, Gillian Knapp, and P. J. Huggins. **269**, 147, 66-F4 (1983)
- SARGENT, W. L. W. The H I Distribution in an Extremely Faint Dwarf Irregular Galaxy M81 dW. W. L. W. Sargent, R. Sancisi, and K. Y. Lo. **265**, 711, 20-D14 (1983)
- SARGENT, WALLACE L. W. Spectrophotometry of 12 Metal-poor Galaxies: Implications for the Primordial Helium Abundance. Daniel Kunth and Wallace L. W. Sargent. **273**, 81, 113-A7 (1983)
- Study of the Close Environment of the Active Nucleus in NGC 1068 by Decomposition of [O III] and H $\beta$  Emission-Line Profiles. Danielle Alloin, Didier Pelat, Alec Boksenberg, and Wallace L. W. Sargent. **275**, 493, 142-G10 (1983)
- SARGOOD, D. G.  $^{26}\text{Mg}(p,n)^{26}\text{Al}$  Cross Section Measurements. R. T. Skelton, R. W. Kavanagh, and D. G. Sargood. **271**, 404, 92-C14 (1983)
- SASLAW, WILLIAM C. Optical Emission in the Radio Lobes of Radio Galaxies. II. New Observations of 25 Radio Lobes. Philippe Crane, J. Anthony Tyson, and William C. Saslaw. **265**, 681, 20-B3 (1983)
- SATO, S. see LAWRENCE, A., et al.
- SAULSON, PETER R. Infrared Photometry of the Halo of M87. Stephen P. Boughn and Peter R. Saulson. **265**, L55, 26-B12 (1983)
- SAVAGE, B. D. Interstellar Abundances of Oxygen and Nitrogen. D. G. York, L. Spitzer, R. C. Bohlin, J. Hill, E. B. Jenkins, B. D. Savage, and T. P. Snow. **266**, L55, 32-D8 (1983)
- SAVAGE, BLAIR D. Absorption of Halo Gas in the Direction of M13. Klaas S. de Boer and Blair D. Savage. **265**, 210, 14-D8 (1983)
- Peculiar Ultraviolet Interstellar Extinction. Derck Massa, Blair D. Savage, and Edward L. Fitzpatrick. **266**, 662, 35-D14 (1983)
- Ultraviolet Interstellar Absorption toward HD 5980 in the Small Magellanic Cloud. Edward L. Fitzpatrick and Blair D. Savage. **267**, 93, 41-A6 (1983)
- The Nature of R136a, the Superluminous Central Object of the 30 Doradus Nebula. Blair D. Savage, Edward L. Fitzpatrick, Joseph P. Cassinelli, and Dennis C. Ebbets. **273**, 597, 120-B1 (1983)

- A Survey of Ultraviolet Interstellar Absorption Lines. *Ralph C. Bohlin, Jesse K. Hill, Edward B. Jenkins, Blair D. Savage, Theodore P. Snow, Jr., Lyman Spitzer, Jr., and Donald G. York*. **51**, 277, 6-B1 (1983) (Abstr. in **265**, 1135, 25-B11)
- SAVONJIE, G. J. On the Evolutionary Status of Bright, Low-Mass X-Ray Sources. *R. F. Webbink, S. Rappaport, and G. J. Savonije*. **270**, 678, 85-E1 (1983)
- SAWYER, C. The Association of Radio Noise Storm Enhancements with the Appearance of Additional Material in the Corona. *A. Kerdran, M. Pick, G. Trotter, C. Sawyer, R. Illing, W. Wagner, and L. House*. **265**, L19, 18-F1 (1983)
- SAYKALLY, R. J. A Search for  $^2\text{H}$ ,  $N=1$ ,  $J=3/2$  Lambda-Doubling Transitions of CH. *L. M. Ziurys, C. Henkel, and R. J. Saykally*. **275**, 175, 139-A4 (1983)
- SCALO, JOHN M. Simulation Models for the Evolution of Cloud Systems. I. Introduction and Preliminary Simulations. *William A. Pumphrey and John M. Scalo*. **269**, 531, 72-C4 (1983)
- SCHAEFER, BRADLEY E. A Large-Amplitude Photometric Periodicity on a T Tauri Star. *Bradley E. Schaefer*. **266**, L45, 32-C13 (1983)
- Orbital Periods of Novae before Eruption. *Bradley E. Schaefer and Joseph Patterson*. **268**, 710, 61-A1 (1983)
- Candidates for a Gamma-Ray Burster Optical Counterpart. *Bradley E. Schaefer, Patrick Seitzer, and Hale V. Bradt*. **270**, L49, 87-B8 (1983)
- SCHARLEMANN, ERNST T. The Dynamics of Dissipatively Heated Spherical Accretion. *Ernst T. Scharlemann*. **272**, 279, 104-A9 (1983)
- SCHECHESTER, PAUL L. The Kinematic Properties of Faint Elliptical Galaxies. *Roger L. Davies, George Efstathiou, S. Michael Fall, Garth Illingworth, and Paul L. Schechter*. **266**, 41, 27-D4 (1983)
- New Central Velocity Dispersions for the Bulges of 53 Spiral and S0 Galaxies. *Paul L. Schechter*. **52**, 425, 16-B4 (1983) (Abstr. in **270**, 780, 86-E7)
- SCHIFFER, FRANCIS H., III. Outer Atmospheres of Cool Stars. XIII. Capella at Critical Phases. *Thomas R. Ayres, Francis H. Schiffer III, and Jeffrey L. Linsky*. **272**, 223, 103-D9 (1983)
- SCHILD, R. VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. *Isabella M. Gioia, E. D. Feigelson, T. Maccacaro, R. Schild, and G. Zamorani*. **271**, 524, 95-C1 (1983)
- SCHILD, R. E. UVB Photometry for Southern OB Stars. *R. E. Schild, R. F. Garrison, and W. A. Hiltner*. **51**, 321, 7-A2 (1983) (Abstr. in **266**, 903, 38-B12)
- Massive Eclipsing Binary Candidates. *R. F. Garrison, R. E. Schild, and W. A. Hiltner*. **52**, 1, 9-A2 (1983) (Abstr. in **267**, 892, 50-D14)
- SCHILD, RUDOLPH. Arp 102B: A New and Unusual Broad-Line Galaxy. *John Stauffer, Rudolph Schild, and William Keel*. **270**, 465, 83-C3 (1983)
- SCHILLER, N. Quasar Evolution: Not a Deficit at "Low" Redshifts. *Y. Avni and N. Schiller*. **267**, 1, 40-A6 (1983)
- SCHINDER, PAUL J. Neutrino Emission from a Hot, Dense, Plane-parallel Atmosphere in Hydrostatic Equilibrium. III. The Three-flavored Atmosphere. *Paul J. Schinder and Stuart L. Shapiro*. **273**, 330, 115-G4 (1983)
- SCHLEGEL, ERIC M. Time-resolved Spectrophotometry of the Nova-like Variable RW Trianguli. *Ronald H. Kaitchuck, R. Kent Honeycutt, and Eric M. Schlegel*. **267**, 239, 42-E1 (1983)
- Time-resolved Spectrophotometry of the Nova-like Variable US Ursae Majoris. *Eric M. Schlegel, R. Kent Honeycutt, and Ronald H. Kaitchuck*. **53**, 397, 22-A5 (1983) (Abstr. in **272**, 786, 110-C11)
- SCHLEICHER, DAVID G. The Discovery of S<sub>2</sub> in Comet Iras-Araki-Alcock 1983d. *Michael F. A'Hearn, Paul D. Feldman, and David G. Schleicher*. **274**, L99, 136-E2 (1983)
- SCHLICKEISER, R. Discovery of a Redshift  $z = 1.2$  Quasar with a Flat Radio Spectrum in the Field of the Gamma-Ray Source CG 195+04. *A. F. J. Moffat, R. Schlickeiser, M. M. Shara, W. Sieber, R. Tuffs, and H. Kühr*. **271**, L45, 100-A4 (1983)
- SCHLOERB, F. PETER. Observations of Sulfur Dioxide in the Kleinmann-Low Nebula. *F. Peter Schloerb, Per Friberg, Åke Hjalmarson, Bertil Höglund, and William M. Irvine*. **264**, 161, 2-F1 (1983)
- Structure of Dense Molecular Gas in TMC 1 from Observations of Three Transitions of HC<sub>3</sub>N. *F. Peter Schloerb, Ronald L. Snell, and Judith S. Young*. **267**, 163, 41-F7 (1983)
- SCHMID-BURGK, JOHANNES. The Acceleration of Molecular Hydrogen Clouds through Radiative Dissociation. *Martin Harwit and Johannes Schmid-Burgk*. **266**, 602, 34-G6 (1983)
- SCHMIDT, G. D. Optical Polarimetry of Broad-Line Radio Galaxies. *Richard J. Rudy, G. D. Schmidt, H. S. Stockman, and Richard L. Moore*. **271**, 59, 88-E8 (1983)
- Identification of CW 1103+254 as a New Magnetic Variable. *H. S. Stockman, C. B. Foltz, G. D. Schmidt, and S. Tapia*. **271**, 725, 97-D5 (1983)
- SCHMIDT, GARY D. Two Hot, Low-Field Magnetic DA White Dwarfs. *James Liebert, Gary D. Schmidt, Richard F. Green, H. S. Stockman, and John T. McGraw*. **264**, 262, 3-F7 (1983)
- Magnetism in the AM Herculis Variable CW 1103+254. *Gary D. Schmidt, H. S. Stockman, and Steven A. Grandi*. **271**, 735, 97-E1 (1983)
- The Most Luminous Quasar: S5 0014+81. *Helmut Kühr, James W. Liebert, Peter A. Strittmatter, Gary D. Schmidt, and Craig Mackay*. **275**, L33, 148-B1 (1983)
- SCHMIDT, MAARTEN. The Galactic Spheroid. *John N. Bahcall, Maarten Schmidt, and Raymond M. Soneira*. **265**, 730, 20-F6 (1983)
- Quasar Evolution Derived from the Palomar Bright Quasar Survey and Other Complete Quasar Surveys. *Maarten Schmidt and Richard F. Green*. **269**, 352, 70-B9 (1983)
- SCHMITT, J. H. M. M. Doubly Diffusive Magnetic Buoyancy Instability in the Solar Interior. *J. H. M. M. Schmitt and R. Rosner*. **265**, 901, 22-F4 (1983)
- SCHNEIDER, DONALD P. CCD Photometry of Abell Clusters. I. Magnitudes and Redshifts for 84 Brightest Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel*. **264**, 337, 6-A5 (1983)
- CCD Photometry of Abell Clusters. II. Surface Photometry of 249 Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel*. **268**, 476, 58-C2 (1983)
- SCHNEIDER, STEPHEN E. Discovery of a Large Intergalactic H I Cloud in the M96 Group. *Stephen E. Schneider, George Helou, Edwin E. Salpeter, and Yervant Terzian*. **273**, L1, 117-B2 (1983)
- Planetary Nebulae and the Galactic Rotation Curve. *Stephen E. Schneider and Yervant Terzian*. **274**, L61, 136-B3 (1983)
- Radial Velocities of Planetary Nebulae. *Stephen E. Schneider, Yervant Terzian, A. Purgathofer, and M. Perinotto*. **52**, 399, 15-G5 (1983) (Abstr. in **270**, 779, 86-E6)
- SCHOLL, J. F. Nonradial g-Mode Oscillations of Warm Neutron Stars. *P. N. McDermott, H. M. Van Horn, and J. F. Scholl*. **268**, 837, 62-C5 (1983)
- SCHOMMER, R. A. Photometry of Resolved Galaxies. II. Sextans A. *J. G. Hoessel, R. A. Schommer, and G. E. Danielson*. **274**, 577, 131-E8 (1983)
- Spectrophotometry of M33 Clusters. *C. A. Christian and R. A. Schommer*. **275**, 92, 138-A11 (1983)
- SCHOMMER, ROBERT. The Age and Composition of the LMC Red Globular Cluster NGC 2121. *Philip Flower, Douglas Geisler, Paul Hodge, Edward Olszewski, and Robert Schommer*. **275**, 15, 137-B7 (1983)
- SCHOMMER, ROBERT A. H I Absorption in the Peculiar Galaxy NGC 6081. *Gregory D. Bothun and Robert A. Schommer*. **267**, L15, 45-C3 (1983)
- SCHÖNBERNER, D. On the Nature of Upsilon Sagittarii. *D. Schönberner and J. S. Drilling*. **268**, 225, 54-D6 (1983)

- SCHÖNBERNER, DETLEF. Late Stages of Stellar Evolution. II. Mass Loss and the Transition of Asymptotic Giant Branch Stars into Hot Remnants. *Detlef Schönberner*. **272**, 708, 109-E2 (1983)
- SCHÖNFELDER, V. Search for Pulsed Gamma-Ray Emission at MeV Energies from 24 Radio Pulsars. U. Graser and V. Schönfelder. **273**, 681, 121-A13 (1983)
- SCHRAMM, DAVID N. Formation of Population III Stars and Galaxies with Primordial Planetary-Mass Black Holes. Katherine Freese, Richard Price, and David N. Schramm. **275**, 405, 142-A5 (1983)
- SCHREIER, ETHAN J. The Inner Radio Structure of Centaurus A: Clues to the Origin of the Jet X-Ray Emission. Jack O. Burns, Eric D. Feigelson, and Ethan J. Schreier. **273**, 128, 113-E6 (1983)
- SCHRIEDER, GERHARD. Cross Section for the Reaction  $^{12}\text{C}(e,p)^{11}\text{B}$  and Its Relevance to the Formation of  $^{11}\text{B}$  in Active Galaxies. Dieter H. H. Hoffmann, Achim Richter, Gerhard Schrieder, and Klaus Seegebarth. **271**, 398, 92-C8 (1983)
- SCHURMANN, STUART R. Radioactive Models of Type I Supernovae. Stuart R. Schurmann. **267**, 779, 49-C10 (1983)
- SCHWARTZ, D. H0323+022: A Puzzling High-Latitude X-Ray/Optical/Radio Source. R. Doxsey, H. Bradt, J. McClintock, L. Petro, R. Remillard, G. Ricker, D. Schwartz, and K. Wood. **264**, L43, 11-A14 (1983)
- Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. M. Garcia, S. L. Balunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson. **267**, 291, 43-A13 (1983)
- SCHWARTZ, D. A. The Discovery of an X-Ray Bright BL Lacertae Object: 0414+009. M. P. Ulmer, Robert L. Brown, D. A. Schwartz, J. Patterson, and R. G. Cruddace. **270**, L1, 81-A2 (1983)
- SCHWARTZ, DANIEL A. Studies of BL Lacertae Objects with the Einstein X-Ray Observatory: The Absolute Volume Density. Daniel A. Schwartz and William H.-M. Ku. **266**, 459, 33-C13 (1983)
- X-Ray Studies of BL Lacertae Objects with the Einstein Observatory: Confrontation with the Synchrotron Self-Compton Predictions. Greg M. Madejski and Daniel A. Schwartz. **275**, 467, 142-E12 (1983)
- SCHWARTZ, P. R. High-Density Gas Associated with "Molecular Jets": NGC 1333 and NGC 2071. P. R. Schwartz, John A. Waak, and Howard A. Smith. **267**, L109, 51-C12 (1983)
- Far-Infrared and Submillimeter Observations of Stellar Radiative and Wind Heating in S140 IRS. P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles. **271**, 625, 96-C13 (1983)
- SCHWARTZ, R. A. First-Order Fermi Acceleration in Solar Flares as a Mechanism for the Second-Step Acceleration of Prompt Protons and Relativistic Electrons. T. Bai, H. S. Hudson, R. M. Pelling, R. P. Lin, R. A. Schwartz, and T. T. von Rosenvinge. **267**, 433, 44-E3 (1983)
- SCHWARTZ, RICHARD D. The Exciting Stars of Herbig-Haro Objects. Martin Cohen and Richard D. Schwartz. **265**, 877, 22-C13 (1983)
- Ultraviolet Continuum and H<sub>2</sub> Fluorescent Emission in Herbig-Haro Objects 43 and 47. Richard D. Schwartz. **268**, L37, 57-C14 (1983)
- SCHWARTZ, J. The X-Ray Morphology of Abell 1367. J. Bechtold, W. Forman, R. Giacconi, C. Jones, J. Schwarz, W. Tucker, and L. Van Speybroeck. **265**, 26, 12-C7 (1983)
- SCHWARZSCHILD, M. Analysis of Box Orbits in a Triaxial Galaxy. M. Vietri and M. Schwarzschild. **269**, 487, 71-F13 (1983)
- SCHWEIZER, FRANÇOIS. Infrared Mapping and UBVRI Photometry of the Spiral Galaxy NGC 1566. John A. Hackwell and François Schweizer. **265**, 643, 19-E11 (1983)
- SCHWENDEMAN, ERIK. cD Galaxy Dynamics and An Aged Ridge (Jet) in 3C 338. Jack O. Burns, Erik Schwendeman, and Richard A. White. **271**, 575, 95-G2 (1983)
- SCHWENN, R. Determination of the Solar Wind Angular Momentum Flux from the Helios Data—An Observational Test of the Weber and Davis Theory. V. Pizzo, R. Schwenn, E. Marsch, H. Rosenbauer, K.-H. Mühllhäuser, and F. M. Neubauer. **271**, 335, 91-E14 (1983)
- SCOTT, EUGENE HOWARD. The Ambipolar Diffusion Time Scale and the Location of Star Formation in Magnetic Interstellar Gas Clouds. Eugene Howard Scott. **275**, 836, 146-F3 (1983)
- SCOVILLE, N. The Circumstellar and Nebular Environment of the Becklin-Neugebauer Object:  $\lambda = 2-5$  Micron Spectroscopy. N. Scoville, S. G. Kleinmann, D. N. B. Hall, and S. T. Ridgway. **275**, 201, 139-C3 (1983)
- SCOVILLE, N. Z. The Polarization of Millimeter-Wave Emission Lines in Dense Interstellar Clouds. P. G. Wannier, N. Z. Scoville, and R. Barvainis. **267**, 126, 41-C11 (1983)
- The Distribution of Molecular Clouds in the Nuclear Region of NGC 1068. N. Z. Scoville, Judith S. Young, and L. B. Lucy. **270**, 443, 83-A10 (1983)
- A 10 Micron Survey of Star Formation in Galactic Nuclei: Virgo Spiral Galaxies. N. Z. Scoville, E. E. Becklin, Judith S. Young, and R. W. Capps. **271**, 512, 95-B3 (1983)
- SCOVILLE, NICK. The Molecular Gas Distribution in M51. Nick Scoville and Judith S. Young. **265**, 148, 13-F5 (1983)
- SCOVILLE, NICK Z. CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville. **269**, 136, 66-E5 (1983)
- SCUDDER, J. D. The Effect of a Non-Maxwellian Electron Distribution on Oxygen and Iron Ionization Balances in the Solar Corona. S. P. Owocki and J. D. Scudder. **270**, 758, 86-C13 (1983)
- SEAB, C. G. The Depletion of Calcium in the Rho Ophiuchi Cloud. Theodore P. Snow, J. G. Timothy, and C. G. Seab. **265**, L67, 26-C10 (1983)
- SEAB, C. GREGORY. Observationally Determined Fe II Oscillator Strengths. J. Michael Shull, Michael Van Steenberg, and C. Gregory Seab. **271**, 408, 92-D4 (1983)
- Shock Processing of Interstellar Grains. C. Gregory Seab and J. Michael Shull. **275**, 652, 144-F5 (1983)
- SEAQUIST, E. R. VLA Observations of the Luminous Supernova Remnant in NGC 4449. R. C. Bignell and E. R. Seaquist. **270**, 140, 78-D10 (1983)
- VLA Radio Continuum Observations of the Edge-on Spiral Galaxy NGC 3079. Nebojsa Duric, E. R. Seaquist, Patrick C. Crane, R. C. Bignell, and L. E. Davis. **273**, L11, 117-B12 (1983)
- VLA Continuum and OH Line Emission Observations of the Compact Nebula VY2-2. E. R. Seaquist and L. E. Davis. **274**, 659, 132-E14 (1983)
- A 21 Centimeter Line Survey of a Complete Sample of Interacting and Isolated Galaxies. Lindsey Elspeth Davis and E. R. Seaquist. **53**, 269, 20-C2 (1983) (Abstr. in **272**, 785, 110-C10)
- SEARS, TREVOR J. Detection of the  $J = 1-0$  Transition of CH<sub>3</sub>CN. Henry E. Matthews and Trevor J. Sears. **267**, L53, 45-E13 (1983)
- The Detection of Vinyl Cyanide in TMC-1. Henry E. Matthews and Trevor J. Sears. **272**, 149, 102-F2 (1983)
- SEEGBARTH, KLAUS. Cross Section for the Reaction  $^{12}\text{C}(e,p)^{11}\text{B}$  and Its Relevance to the Formation of  $^{11}\text{B}$  in Active Galaxies. Dieter H. H. Hoffmann, Achim Richter, Gerhard Schrieder, and Klaus Seegebarth. **271**, 398, 92-C8 (1983)
- SEGGEWISS, WILHELM. Spectroscopic and Photometric Analysis of the WN7 Eclipsing Binary CQ Cephei. Kam-Ching Leung, Anthony F. J. Moffat, and Wilhelm Seggewiss. **265**, 961, 23-C9 (1983)



- A Spectroscopic Study of Four Late-Type Galactic WN Stars: The Question of Duplicity. *Robert Lamontagne, Anthony F. J. Moffat, and Wilhelm Seggewiss.* **269**, 596, 73-A1 (1983)
- SEIDEN, PHILIP E. The Role of the Gas in Propagating Star Formation. *Philip E. Seiden.* **266**, 555, 34-C12 (1983)
- SEIELSTAD, G. A. Interferometric Observations of Solar Limb Structure at 2.6 Millimeters. *P. G. Wannier, G. J. Hurford, and G. A. Seielstad.* **264**, 660, 9-D14 (1983)
- Rectilinear Motions in 3C 345. *M. H. Cohen, S. C. Unwin, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker.* **269**, L1, 69-A3 (1983)
- Superluminal Motion in the Quasar 3C 345. *S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker.* **271**, 536, 95-C13 (1983)
- SEITZER, PATRICK. Candidates for a Gamma-Ray Burst Optical Counterpart. *Bradley E. Schaefer, Patrick Seitzer, and Hale V. Bradt.* **270**, L49, 87-B8 (1983)
- SELBY, M. J. *see* LAWRENCE, A., *et al*
- SELDNER, MICHAEL. Effect of Variable Obscuration on the Clustering of Galaxies. *Michael Seldner and Juan M. Uson.* **264**, 1, 1-A6 (1983)
- SELLGREN, K. Extended Near-Infrared Emission from Visual Reflection Nebulae. *K. Sellgren, M. W. Werner, and Harriet L. Dinerstein.* **271**, L13, 93-A13 (1983)
- SEMEL, M. Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. *J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado.* **265**, 1066, 24-D5 (1983)
- SEMNZATO, ROBERTO. On the Effects of Strong Encounters in Stellar Systems. I. A Basis for Treating Anisotropic Systems. *James R. Ipser and Roberto Semenzato.* **271**, 294, 91-B13 (1983)
- SERIO, S. Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. *R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner.* **270**, 270, 79-G7 (1983)
- SEWARD, F. The Mass of Tycho's Supernova Remnant as Determined from a High-Resolution X-Ray Map. *F. Seward, P. Gorenstein, and W. Tucker.* **266**, 287, 30-A14 (1983)
- SEWARD, F. D. MSH 15-52: A Supernova Remnant Containing Two Compact X-Ray Sources. *F. D. Seward, F. R. Harnden, Jr., P. Murdin, and David H. Clark.* **267**, 698, 48-D4 (1983)
- The Period History of the X-Ray Pulsar in MSH 15-52. *M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Narayan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward.* **267**, 711, 48-E5 (1983)
- The X-Ray Lobes of SS 433. *M. G. Watson, R. Willingale, J. E. Grindlay, and F. D. Seward.* **273**, 688, 121-B6 (1983)
- SHAFFER, D. B. VLBI Maps of 3C 147, 3C 286, 3C 380, NRAO 150, CTD 93, and 3C 395 at 2.3 GHz. *R. B. Phillips and D. B. Shaffer.* **271**, 32, 88-C9 (1983)
- SHAFFER, DAVID B. CCD Photometry of the BL Lacertae Object 1400+162 and the Associated Group of Galaxies. *Donna Weistrop, David B. Shaffer, Harold J. Reitsema, and Bradford A. Smith.* **271**, 471, 94-E11 (1983)
- SHAFTER, ALLEN W. Spectral Energy Distributions of Young Stellar Objects. I. A Turbospheric Model for DR Tauri. *Roger K. Ulrich, Allen W. Shafter, George Hawkins, and Gillian Knapp.* **267**, 199, 42-B2 (1983)
- Radial Velocity Studies of Cataclysmic Binaries. I. KR Aurigae. *Allen W. Shafter.* **267**, 222, 42-C11 (1983)
- SHANKAR, A. Partition Functions and Dissociation Constraints for Zirconium Oxide. *A. Shankar and J. E. Littleton.* **274**, 916, 135-D11 (1983)
- SHANKS, T. The Clustering of Galaxies in a Complete Redshift Survey. *T. Shanks, A. J. Bean, G. Efsthathiou, R. S. Ellis, R. Fong, and B. A. Peterson.* **274**, 529, 130-G8 (1983)
- SHAPIRO, M. M. Cosmic Rays from Active Galactic Nuclei and in Metagalactic Space. *M. M. Shapiro and R. Silberberg.* **265**, 570, 18-C1 (1983)
- SHAPIRO, PAUL R. Polarization of Interstellar Molecular Radiofrequency Absorption Lines. *Nikolaos D. Kylafis and Paul R. Shapiro.* **272**, L35, 105-F12 (1983)
- Pancakes and the Formation of Galaxies in a Neutrino-dominated Universe. *Paul R. Shapiro, Curtis Struck-Marcell, and Adrian L. Melott.* **275**, 413, 142-A13 (1983)
- SHAPIRO, STUART L. Hierarchical Merging and the Structure of Elliptical Galaxies. *Rida T. Farouki, Stuart L. Shapiro, and Martin J. Duncan.* **265**, 597, 19-B5 (1983)
- Masses, Radii, and Magnetic Fields of Pulsating X-Ray Sources: Is the "Standard" Model Self-consistent? *Ira Wasserman and Stuart L. Shapiro.* **265**, 1036, 24-B2 (1983)
- Equilibrium Composition and Neutrino Emissivity of Interacting Quark Matter in Neutron Stars. *Robert C. Duncan, Stuart L. Shapiro, and Ira Wasserman.* **267**, 358, 43-F12 (1983)
- Monte Carlo Simulations of the Evolution of Galactic Nuclei Containing Massive, Central Black Holes. *Martin J. Duncan and Stuart L. Shapiro.* **268**, 565, 59-C1 (1983)
- Simulations of Galaxy Mergers: Cannibalism and Dynamical Friction. *Martin J. Duncan, Rida T. Farouki, and Stuart L. Shapiro.* **271**, 22, 88-B13 (1983)
- Implications of the Millisecond Pulsar for Neutron Star Models. *Stuart L. Shapiro, Saul A. Teukolsky, and Ira Wasserman.* **272**, 702, 109-D10 (1983)
- Neutrino Emission from a Hot, Dense, Plane-parallel Atmosphere in Hydrostatic Equilibrium. III. The Three-flavored Atmosphere. *Paul J. Schinder and Stuart L. Shapiro.* **273**, 330, 115-G4 (1983)
- SHARA, M. M. Discovery of a Redshift  $z = 1.2$  Quasar with a Flat Radio Spectrum in the Field of the Gamma-Ray Source CG 195+04. *A. F. J. Moffat, R. Schlickeiser, M. M. Shara, W. Sieber, R. Tuffs, and H. Kühr.* **271**, L45, 100-A4 (1983)
- SHARA, MICHAEL M. WY Sagittae (Nova 1783): Spectroscopic Confirmation of Weaver's Candidate and Discovery of Deep Eclipses. *Michael M. Shara and Anthony F. J. Moffat.* **264**, 560, 8-D5 (1983)
- Wolf-Rayet Stars in the Local Group Galaxies M31 and NGC 6822. *Anthony F. J. Moffat and Michael M. Shara.* **273**, 544, 119-E3 (1983)
- SHARE, G. H. Gamma-Ray Observational Constraints on the Origin of the Optical Continuum Emission from the White-Light Flare of 1980 July 1. *J. M. Ryan, E. L. Chupp, D. J. Forrest, S. M. Matz, E. Rieger, C. Reppin, G. Kanbach, and G. H. Share.* **272**, L61, 111-B8 (1983)
- SHARMA, R. R. Stochastic Three-Wave Interaction in Flaring Solar Loops. *Loukas Vlahos, R. R. Sharma, and K. Papadopoulos.* **275**, 374, 141-A12 (1983)
- SHAVER, PETER A. Common Absorption Systems in the Spectra of the QSO Pair Q0307-195A. *B. Peter A. Shaver and J. Gordon Robertson.* **268**, L57, 63-D4 (1983)
- SHEELEY, N. R., JR. Associations between Coronal Mass Ejections and Soft X-Ray Events. *N. R. Sheeley, Jr., R. A. Howard, M. J. Koomeen, and D. J. Michels.* **272**, 349, 104-G1 (1983)
- SHEERIN, JAMES P. Alfvén Wave Collapse and the Stability of a Relativistic Electron Beam in a Magnetized Astrophysical Plasma. *Steven R. Spangler and James P. Sheerin.* **272**, 273, 104-A3 (1983)
- SHEMANSKY, DONALD E. A Deficiency of O III in the Io Plasma Torus. *Robert A. Brown, Donald E. Shemansky, and Robert E. Johnson.* **264**, 309, 4-B14 (1983)
- Escape and Ionization of Atomic Oxygen from Io. *William H. Smyth and Donald E. Shemansky.* **271**, 865, 99-A1 (1983)
- SHIBAHASHI, HIROMOTO. Magnetic Overstability as an Excitation Mechanism of the Rapid Oscillations of Ap Stars. *Hiromoto Shibahashi.* **275**, L5, 141-F6 (1983)
- SHIBAZAKI, N. *see also* LAWRENCE, A., *et al*

- SHIBAZAKI, N. Observations of Centaurus X-3 by *Hakucho*. T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- SHIELDS, G. A. Stimulated Emission and the Flat Balmer Decrement of Cataclysmic Variable Stars. Moshe Eliuzur, G. J. Ferland, W. G. Mathews, and G. A. Shields. **272**, L55, 111-B3 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. Beverley J. Willis, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Willis, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- SHIELDS, GREGORY A. Compton Heated Winds and Coronae above Accretion Disks. I. Dynamics. Mitchell C. Begelman, Christopher F. McKee, and Gregory A. Shields. **271**, 70, 88-F9 (1983)
- SHINE, D. Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado. **265**, 1066, 24-D5 (1983)
- SHINE, R. A. Fluid Motions in the Solar Chromosphere-Corona Transition Region. I. Line Widths and Doppler Shifts for C IV. R. G. Athay, J. B. Gurman, W. Henze, and R. A. Shine. **265**, 519, 17-F3 (1983)
- Simultaneous Ultraviolet Line and Hard X-Ray Bursts in the Impulsive Phase of Solar Flares. B. E. Woodgate, R. A. Shine, A. I. Poland, and L. E. Orwig. **265**, 530, 17-G1 (1983)
- Formation of the C I  $\lambda$  Lines at 1351 Å in the Solar Chromosphere. R. A. Shine. **266**, 882, 38-A5 (1983)
- SHIPMAN, HARRY L. Iron and Magnesium in the White Dwarf GD 40: A Test of Diffusion Theory. Harry L. Shipman and Jesse L. Greenstein. **266**, 761, 36-E12 (1983)
- A Proposed New White Dwarf Spectral Classification System. Edward M. Sion, Jesse L. Greenstein, John D. Landstreet, James Liebert, Harry L. Shipman, and Gary A. Wegner. **269**, 253, 68-A1 (1983)
- SHIPSEY, E. J. The D-P Transition in Atomic Oxygen Induced by Collisions with Atomic Hydrogen. S. R. Federman and E. J. Shipsey. **269**, 791, 75-B4 (1983)
- SHIVANANDAN, K. The Brighter 94 Micron Sources Observed by the Far-Infrared Sky Survey Experiment. Stephan D. Price, K. Shivanandan, Thomas L. Murdock, and Phillip F. Bowers. **275**, 125, 138-D8 (1983)
- SHORE, STEVEN N. The Effects of Induced Star Formation on the Evolution of the Galaxy. II. The Galactic Ecosystem. Steven N. Shore. **265**, 202, 14-C14 (1983)
- The Extreme LMC Supergiant HD 38489: An Optical and Ultraviolet Study. Steven N. Shore and N. Sanduleak. **273**, 177, 114-B8 (1983)
- SHOUB, EDWARD C. Invalidity of Local Thermodynamic Equilibrium for Electrons in the Solar Transition Region. I. Fokker-Planck Results. Edward C. Shoub. **266**, 339, 30-E12 (1983)
- SHU, FRANK H. Ambipolar Diffusion in Self-gravitating Isothermal Layers. Frank H. Shu. **273**, 202, 114-D7 (1983)
- SHUKLA, P. K. Nonlinear Propagation of Hydromagnetic Waves in High-Beta Plasmas. P. K. Shukla. **268**, 396, 56-B13 (1983)
- Interpretation of Solar Type III Radio Emission. Mitsuhiro Nambu and P. K. Shukla. **271**, L35, 93-C7 (1983)
- SHULL, J. MICHAEL. Feeding Quasars with Stellar Winds. J. Michael Shull. **264**, 446, 7-B11 (1983)
- The Kinetic Theory of H<sub>2</sub> Dissociation. Stephen Lepp and J. Michael Shull. **270**, 578, 84-D9 (1983)
- Observationally Determined Fe II Oscillator Strengths. J. Michael Shull, Michael Van Steenberg, and C. Gregory Seab. **271**, 408, 92-D4 (1983)
- Shock Processing of Interstellar Grains. C. Gregory Seab and J. Michael Shull. **275**, 652, 144-F5 (1983)
- SHULL, PETER, JR. Velocity Dispersions of Knots in Vela X and Puppis A. Peter Shull, Jr. **269**, 218, 67-E5 (1983)
- The Kinematics and Structure of N63A and Associated H II Regions. Peter Shull, Jr. **275**, 592, 144-A9 (1983)
- The Kinematics and Structure of N49. Peter Shull, Jr. **275**, 611, 144-C2 (1983)
- SHURE, M. A. Detection of Sulfur in the Galactic Center. T. Herter, D. A. Briotta, Jr., G. E. Gull, M. A. Shure, and J. R. Houck. **267**, L37, 45-D13 (1983)
- Determinations of S III, O IV, and Ne V Abundances in Planetary Nebulae from Infrared Lines. M. A. Shure, T. Herter, J. R. Houck, D. A. Briotta, Jr., W. J. Forrest, G. E. Gull, and J. F. McCarthy. **270**, 645, 85-B9 (1983)
- O IV Temperature Determination for NGC 7662. M. A. Shure, T. Herter, and J. R. Houck. **274**, 646, 132-D11 (1983)
- SIAM, M. JAVAD. Beam Models for Radio Sources. IV. Improved Jet Collimation. M. Javad Siah and Paul J. Witta. **270**, 427, 82-G1 (1983)
- SIEBER, W. Discovery of a Redshift  $z = 1.2$  Quasar with a Flat Radio Spectrum in the Field of the Gamma-Ray Source CG 195+04. A. F. J. Moffat, R. Schlickeiser, M. M. Shara, W. Sieber, R. Tuffs, and H. Kühr. **271**, L45, 100-A4 (1983)
- SIEGBAHN, PER E. M. A Theoretical Investigation of the Radiative Properties of the CN Red and Violet Systems. Mats Larsson, Per E. M. Siegbahn, and Hans Ågren. **272**, 369, 105-A10 (1983)
- SIENKIEWICZ, RYSZARD. The Minimum Period and the Gap in Periods of Cataclysmic Binaries. Bohdan Paczyński and Ryszard Sienkiewicz. **268**, 825, 62-B7 (1983)
- SILBERBERG, R. Cosmic Rays from Active Galactic Nuclei and in Metagalactic Space. M. M. Shapiro and R. Silberberg. **265**, 570, 18-C1 (1983)
- Proton-Nucleus Total Inelastic Cross Sections: An Empirical Formula for  $E > 10$  MeV. John R. Letaw, R. Silberberg, and C. H. Tsao. **51**, 271, 6-A2 (1983) (Abstr. in **265**, 1136, 25-B12)
- SILK, JOSEPH. The Peculiar Velocity Field in Flattened Superclusters. A. S. Szalay and Joseph Silk. **264**, L31, 11-A4 (1983)
- The Dynamics and Fueling of Active Nuclei. Colin Norman and Joseph Silk. **266**, 502, 33-F14 (1983)
- Can Graininess in the Early Universe Make Galaxies? B. J. Carr and Joseph Silk. **268**, 1, 52-A6 (1983)
- Decay of Long-lived Particles in the Early Universe. Joseph Silk and Albert Stebbins. **269**, 1, 65-A6 (1983)
- X-Ray Emission from Pre-Main-Sequence Stars, Molecular Clouds, and Star Formation. Joseph Silk and Colin Norman. **272**, L49, 111-A12 (1983)
- H<sub>2</sub>O Heating in Molecular Clouds: Line Transfer and Thermal Balance in a Warm Dusty Medium. Takamasa Takahashi, David J. Hollenbach, and Joseph Silk. **275**, 145, 138-E14 (1983)
- SIMKIN, S. M. Radio Structure and Optical Kinematics of the cD Galaxy Hydra A (3C 218). R. D. Ekers and S. M. Simkin. **265**, 85, 13-A5 (1983)
- SIMON, G. W. Flux Changes in Small Magnetic Regions. P. R.

- Wilson and G. W. Simon. **273**, 805, 122-C14 (1983)
- SIMON, M. Infrared Line and Radio Continuum Emission of Circumstellar Ionized Regions. *M. Simon, M. Felli, L. Cassar, J. Fischer, and M. Massi*. **266**, 623, 35-B1 (1983)
- Luminous Molecular Hydrogen Emission in the Galaxy System NGC 3690-IC 694. *J. Fischer, M. Simon, J. Benson, and P. M. Solomon*. **273**, L27, 117-C13 (1983)
- SIMON, NORMAN R. The Structural Properties of Cepheid Velocity Curves. *Norman R. Simon and Terry J. Teays*. **265**, 996, 23-F2 (1983)
- The Light and Velocity Curves of Classical Cepheids: Theory versus Observation. *Norman R. Simon and Cecil G. Davis*. **266**, 787, 37-A1 (1983)
- Temperature-Grid Coordinates for Treating Pulsations in the Hydrogen Ionization Zone. *Toshiki Aikawa and Norman R. Simon*. **273**, 346, 116-A11 (1983)
- SIMON, R. S. Rectilinear Motions in 3C 345. *M. H. Cohen, S. C. Unwin, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **269**, L1, 69-A3 (1983)
- Superluminal Motion in the Quasar 3C 345. *S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **271**, 536, 95-C13 (1983)
- VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young*. **272**, 383, 106-A5 (1983)
- SIMON, THEODORE. Infrared Photometry of O Stars. *John I. Castor and Theodore Simon*. **265**, 304, 15-D9 (1983)
- Observations of H<sub>2</sub> Emission from Molecular Clouds and Herbig-Haro Objects. *Theodore Simon and R. R. Joyce*. **265**, 864, 22-B14 (1983)
- Outer Atmospheres of Cool Stars. XIV. A Model for the Chromosphere and Transition Region of Beta Ceti (G9.5 III). *Kjell Eriksson, Jeffrey L. Linsky, and Theodore Simon*. **272**, 665, 109-A13 (1983)
- Outer Atmospheres of Cool Stars. XV. High-Dispersion Ultraviolet Studies of Active Chromosphere G-K Dwarfs. *Thomas R. Ayres, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, and Alexander Brown*. **274**, 784, 134-A1 (1983)
- Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold*. **274**, 801, 134-B5 (1983)
- SIMONSON, GREGORY F. Estimating the Tumble Rates of Galaxy Halos. *Gregory F. Simonson and Joel E. Tohline*. **268**, 638, 60-B10 (1983)
- SIMPSON, E. Simultaneous Visual-Infrared Polarimetry of QSOs. *J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti*. **265**, 625, 19-D6 (1983)
- SIMPSON, J. A. The Anomalous Helium Component in the Heliosphere: The 1965 versus the 1972-1977 Solar Minimum. *M. Garcia-Munoz, K. R. Pyle, and J. A. Simpson*. **274**, L93, 136-D11 (1983)
- A Quantitative Test of Solar Modulation Theory: The Proton, Helium, and Electron Spectra from 1965 through 1979. *P. Evenson, M. Garcia-Munoz, P. Meyer, K. R. Pyle, and J. A. Simpson*. **275**, L15, 141-F14 (1983)
- SION, EDWARD M. The Hot DO White Dwarf HD 149499 B: Einstein Redshift of a DB Progenitor with Carbon Features. *Edward M. Sion and Edward F. Guinan*. **265**, L87, 26-E1 (1983)
- A Proposed New White Dwarf Spectral Classification System. *Edward M. Sion, Jesse L. Greenstein, John D. Landstreet, James Liebert, Harry L. Shipman, and Gary A. Wegner*. **269**, 253, 68-A1 (1983)
- SITKO, M. Simultaneous Visual-Infrared Polarimetry of QSOs. *J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti*. **265**, 625, 19-D6 (1983)
- SITKO, MICHAEL L. Molecular Emission Bands in the Ultraviolet Spectrum of the Red Rectangle Star HD 44179. *Michael L. Sitko*. **265**, 848, 22-A10 (1983)
- SKELTON, R. T. <sup>24</sup>Mg(p,n)<sup>24</sup>Al Cross Section Measurements. *R. T. Skelton, R. W. Kavanagh, and D. G. Sargood*. **271**, 404, 92-C14 (1983)
- SKINNER, T. E. Temporal Variations of the Jovian H I Lyman-Alpha Emission (1979-1982). *T. E. Skinner, S. T. Durrance, P. D. Feldman, and H. W. Moos*. **265**, L23, 18-F6 (1983)
- IUE Spectrum of the Io Torus: Identification of the <sup>1</sup>S<sub>2</sub> → <sup>1</sup>P<sub>2,1</sub> Transitions of S III. *H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou*. **275**, L19, 141-G4 (1983)
- SKUMANICH, ANDREW. Rapid Rotation and Stellar Activity in the Triple System HD 165590. *Robert A. Stern and Andrew Skumanich*. **267**, 232, 42-D8 (1983)
- SLAGTER, R. J. Numerical Solutions of High-Frequency Perturbations in Bianchi Type IX Models. *R. J. Slagter*. **268**, 513, 58-E13 (1983)
- SLETTEBAK, ARNE. Ultraviolet Spectroscopic Observations of Some Be Stars of Later Type and A-F Type Shell Stars. *Arne Slettebak and Kenneth G. Carpenter*. **53**, 869, 28-G1 (1983) (Abstr. in **274**, 923, 135-E4)
- SMAK, J. On the Nature of Dwarf Novae. *J. Smak*. **272**, 234, 103-E6 (1983)
- SMARR, LARRY. Bubbles, Jets, and Clouds in Active Galactic Nuclei. *Michael D. Smith, Larry Smarr, Michael L. Norman, and James R. Wilson*. **264**, 432, 7-A11 (1983)
- SMATHERS, H. W. H0547 - 14: X-Ray Flux from a Weak Gamma-Ray Burst? *C. Ambruster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman*. **269**, 779, 75-A6 (1983)
- SMITH, A. G. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea*. **274**, 101, 125-A9 (1983)
- SMITH, A. M. Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart*. **267**, L89, 51-B7 (1983)
- Images in the Rocket Ultraviolet: The Starburst in the Nucleus of M83. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, and T. P. Stecher*. **274**, L53, 136-A8 (1983)
- SMITH, ALEX G. Optical Variability, Absolute Luminosity, and the Hubble Diagram for QSOs. *Andrew J. Pica and Alex G. Smith*. **272**, 11, 101-B2 (1983)
- SMITH, BRADFORD A. CCD Photometry of the BL Lacertae Object 1400+162 and the Associated Group of Galaxies. *Donna Weistrop, David B. Shaffer, Harold J. Reitsema, and Bradford A. Smith*. **271**, 471, 94-E11 (1983)
- SMITH, BRUCE F. Stochastic Self-propagating Star Formation in Three-dimensional Disk Galaxy Simulations. *Thomas Stalter, Neil Comins, and Bruce F. Smith*. **270**, 79, 77-G3 (1983)
- SMITH, DAVID. Laboratory Measurements of Ion-Molecule Re-

- actions Pertaining to Interstellar Hydrocarbon Synthesis. *Eric Herbst, Nigel G. Adams, and David Smith*. **269**, 329, 68-F12 (1983)
- Association Reactions of  $\text{Na}^+$  and Some Implications for Interstellar Chemistry. *David Smith, Nigel G. Adams, Erich Alge, and Eric Herbst*. **272**, 365, 105-A6 (1983)
- SMITH, GRAEME H. The Cyanogen Distribution of the Red Giants in M5. *Graeme H. Smith and John Norris*. **264**, 215, 3-C1 (1983)
- The Chemical Inhomogeneity of the Sculptor Dwarf Spheroidal Galaxy. *Graeme H. Smith and Michael A. Dopita*. **271**, 113, 89-B11 (1983)
- The Al I-Cyanogen Correlation in the Spectra of Globular Cluster Red Giants and the Origin of Intercluster Heavy Element Variations. *John Norris and Graeme H. Smith*. **272**, 635, 108-F8 (1983)
- The Cyanogen Distribution of the Giants in NGC 2808. *John Norris and Graeme H. Smith*. **275**, 120, 138-D1 (1983)
- SMITH, HARDING E. Spectrophotometry of the Broad Absorption-Line QSO PHL 5200. *Vesa T. Junkkarinen, E. Margaret Burbidge, and Harding E. Smith*. **265**, 51, 12-E13 (1983)
- SMITH, HAYWOOD, JR. On the Mass and Extent of the Coma Cluster of Galaxies. *Haywood Smith, Jr.* **270**, 422, 82-F10 (1983)
- SMITH, HORACE A. Metal Abundances of RR Lyrae Stars in Globular Clusters: Erratum. *Horace A. Smith and George J. Perkins*. **267**, 891, 50-D13 (1983) (Orig. paper in **261**, 576, 118-A8)
- SMITH, HOWARD A. High-Density Gas Associated with "Molecular Jets": NGC 1333 and NGC 2071. *P. R. Schwartz, John A. Waak, and Howard A. Smith*. **267**, L109, 51-C12 (1983)
- Far-Infrared and Submillimeter Observations of Stellar Radiative and Wind Heating in S140 IRS. *P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles*. **271**, 625, 96-C13 (1983)
- Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith*. **274**, 571, 131-E1 (1983)
- SMITH, J. Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith*. **274**, 571, 131-E1 (1983)
- SMITH, M. D. The Shape of Cooling Filaments in Old Supernova Remnants. *M. D. Smith and J. R. Dickel*. **265**, 272, 15-B4 (1983)
- SMITH, M. G. Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low*. **273**, 58, 112-F10 (1983)
- SMITH, MALCOLM. The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin*. **269**, 375, 70-E2 (1983)
- SMITH, MALCOLM G. Globular Cluster Systems in the Hydra I Elliptical Galaxies. II. *William E. Harris, Malcolm G. Smith, and Eric S. Myra*. **272**, 456, 106-F13 (1983)
- SMITH, MICHAEL D. Bubbles, Jets, and Clouds in Active Galactic Nuclei. *Michael D. Smith, Larry Smarr, Michael L. Norman, and James R. Wilson*. **264**, 432, 7-A11 (1983)
- SMITH, MYRON A. Precise Radial Velocities. II. A Possible Detection of Oscillations or Running Waves in Aldebaran and Arcturus. *Myron A. Smith*. **265**, 325, 15-F2 (1983)
- Pulsational Mode-Typing in Line Profile Variables. V. Multi-modes and "Moving Shells" in  $\nu$  Eridani and Other  $\beta$  Cephei Stars. *Myron A. Smith*. **265**, 338, 15-G2 (1983)
- Rotation among Orion Ic G Stars: Angular Momentum Loss Considerations in Pre-Main-Sequence Stars. *Myron A. Smith, Jacques M. Beckers, and Samuel C. Barden*. **271**, 237, 90-E11 (1983)
- X-Rays and Rotation among Post-T Tauri G Stars in Orion Ic. *Myron A. Smith, Steven H. Pravdo, and William H.-M. Ku*. **272**, 163, 102-G2 (1983)
- SMITH, R. M. Infrared Observations of the Jet in M87. *R. M. Smith, G. V. Bicknell, A. R. Hyland, and T. J. Jones*. **266**, 69, 27-F4 (1983)
- SMITH, VERNE V. Quantitative Technetium and Niobium Abundances in Heavy-Element Stars. *Verne V. Smith and George Wallerstein*. **273**, 742, 121-F6 (1983)
- SMITH, WM. HAYDEN. Desaturation of  $\text{H}_2$  Quadrupole Lines in the Atmospheres of the Outer Planets. *William D. Cochran and Wm. Hayden Smith*. **271**, 859, 98-G6 (1983)
- SMOOT, G. Linear and Circular Polarization of the Cosmic Background Radiation. *P. Lubin, P. Melese, and G. Smoot*. **273**, L51, 123-A4 (1983)
- SMYERS, SCOTT D. The 157 Micron [C II] Emission from NGC 2024: Core and Halo Components. *Noel L. Kurtz, Scott D. Smyers, Ray W. Russell, Martin Harwit, and Gary Melnick*. **264**, 538, 8-B11 (1983)
- Observations of the 145.5 Micron [O I] Emission Line in the Orion Nebula. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit*. **265**, L7, 18-E5 (1983)
- The Galaxy's 157 Micron [C II] Emission: Observations by Means of a Spectroscopic Lunar Occultation Technique. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit*. **268**, L99, 63-G14 (1983)
- SMYTH, WILLIAM H. Io's Sodium Cloud: Explanation of the East-West Asymmetries. II. *William H. Smyth*. **264**, 708, 10-A14 (1983)
- Escape and Ionization of Atomic Oxygen from Io. *William H. Smyth and Donald E. Shemansky*. **271**, 865, 99-A1 (1983)
- SNEDEN, CHRISTOPHER. The R- and s-Process Nuclei in the Early History of the Galaxy: HD 122563. *Christopher Sneden and M. Parthasarathy*. **267**, 757, 49-A11 (1983)
- The Chemical Composition of Stars in Globular Clusters. *Catherine A. Pilachowski, Christopher Sneden, and George Wallerstein*. **52**, 241, 12-G9 (1983) (Abstr. in **269**, 810, 75-C9)
- SNELL, RONALD L. J = 2-1 CO Observations of Molecular Clouds with High-Velocity Gas: Evidence for Clumpy Outflows. *Richard L. Plambeck, Ronald L. Snell, and Robert B. Loren*. **266**, 321, 30-D8 (1983)
- Structure of Dense Molecular Gas in TMC 1 from Observations of Three Transitions of  $\text{HC}_3\text{N}$ . *F. Peter Schloerb, Ronald L. Snell, and Judith S. Young*. **267**, 163, 41-F7 (1983)
- A Survey of High-Velocity Molecular Gas in the Vicinity of Herbig-Haro Objects. I. *Suzan Edwards and Ronald L. Snell*. **270**, 605, 84-F8 (1983)
- Cyanoacetylene as a Density Probe of Molecular Clouds. *Paul A. Vanden Bout, Robert B. Loren, Ronald L. Snell, and Alwyn Wootten*. **271**, 161, 89-F7 (1983)
- Radio Images of the Bipolar H II Region S106. *John Bally, Ronald L. Snell, and Read Predmore*. **272**, 154, 102-F7 (1983)
- Vibrationally Excited  $\text{CH}_3\text{CN}$  and  $\text{HC}_3\text{N}$  in Orion. *Paul F. Goldsmith, Robert Krotkov, Ronald L. Snell, R. D. Brown, and Peter Godfrey*. **274**, 184, 125-G8 (1983)
- SNODGRASS, HERSHEL B. Magnetic Rotation of the Solar Photosphere. *Herschel B. Snodgrass*. **270**, 288, 80-A12 (1983)
- SNOW, T. P. Interstellar Abundances of Oxygen and Nitrogen. *D. G. York, L. Spitzer, R. C. Bohlin, J. Hill, E. B. Jenkins, B. D. Savage, and T. P. Snow*. **266**, L55, 32-D8 (1983)
- SNOW, T. P., JR. Observations of Of-Star Wind Variability. *C. A. Grady, T. P. Snow, Jr., and J. G. Timothy*. **271**, 691, 97-A13 (1983)



- SNOW, THEODORE P. The Depletion of Calcium in the Rho Ophiuchi Cloud. *Theodore P. Snow, J. G. Timothy, and C. G. Seab.* **265**, L67, 26-C10 (1983)
- On the Possibly Low H<sub>2</sub> Formation Rate in Dense Clouds. *Theodore P. Snow.* **269**, L57, 76-C2 (1983)
- SNOW, THEODORE P., JR. The Ionization Equilibrium inside the Rho Ophiuchi Cloud. *Theodore P. Snow, Jr.* **266**, 576, 34-E6 (1983)
- Einstein Observations of X-Ray Emission from A Stars. *L. Golub, F. R. Harnden, Jr., C. W. Maxson, R. Rosner, G. S. Vaiana, Webster Cash, Jr., and Theodore P. Snow, Jr.* **271**, 264, 90-G11 (1983)
- A Survey of Ultraviolet Interstellar Absorption Lines. *Ralph C. Bohlin, Jesse K. Hill, Edward B. Jenkins, Blair D. Savage, Theodore P. Snow, Jr., Lyman Spitzer, Jr., and Donald G. York.* **51**, 277, 6-B1 (1983) (Abstr. in **265**, 1135, 25-B11)
- SNYDER, L. E. Methanol in Orion A: Simultaneous Observations of Corresponding Rotational Transitions in the Ground and Torsionally Excited States. *J. M. Hollis, F. J. Lovas, R. D. Suenram, P. R. Jewell, and L. E. Snyder.* **264**, 543, 8-C2 (1983)
- An Extensive Galactic Search for Conformer II Glycine. *L. E. Snyder, J. M. Hollis, R. D. Suenram, F. J. Lovas, L. W. Brown, and D. Buhl.* **268**, 123, 53-C3 (1983)
- An Upper Limit to the Microwave Continuum Radiation from Comet Austin (1982g). *L. E. Snyder, Patrick Palmer, and C. M. Wade.* **269**, L21, 69-B6 (1983)
- SODERBLOM, DAVID R. Rotational Studies of Late-Type Stars. III. Rotation among BY Draconis Stars. *Steven S. Vogt, David R. Soderblom, and G. Donald Penrod.* **269**, 250, 67-G11 (1983)
- Rapid Rotation among Pleiades K Dwarfs. *David R. Soderblom, Burton F. Jones, and Merle F. Walker.* **274**, L37, 129-C12 (1983)
- Rotational Studies of Late-Type Stars. II. Ages of Solar-Type Stars and the Rotational History of the Sun. *David R. Soderblom.* **53**, 1, 17-A3 (1983) (Abstr. in **271**, 889, 99-B11)
- SOFUE, Y. A Bisymmetric Spiral Magnetic Field and the Spiral Arms in Our Galaxy. *Y. Sofue and M. Fujimoto.* **265**, 722, 20-E12 (1983)
- SOIFER, B. T. Infrared/Optical Energy Distributions of High-Redshift Quasars. *B. T. Soifer, G. Neugebauer, J. B. Oke, K. Matthews, and J. H. Lacy.* **265**, 18, 12-B12 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. *R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek.* **268**, 68, 52-F3 (1983)
- SOL, H. Radiative or Two-Stream Instability as a Source for Pulsar Radio Emission. *E. Asséo, R. Pellat, and H. Sol.* **266**, 201, 29-B8 (1983)
- SOLF, JOSEPH. Optical Confirmation of a Very Compact Bipolar Nebula Associated with the Symbiotic Star V1016 Cygni. *Joseph Solf.* **266**, L113, 39-C12 (1983)
- On the Geometrical and Kinematic Structure of the Postnova Shell of HR Delphini. *Joseph Solf.* **273**, 647, 120-F1 (1983)
- SOLOMON, P. M. CO Emission and the Optical Disk in the Giant Sc Galaxy M101. *P. M. Solomon, J. Barrelet, D. B. Sanders, and R. de Zafra.* **266**, L103, 39-C3 (1983)
- CO Emission in the Outer Galaxy between Longitudes 50° and 72°. *P. M. Solomon, A. A. Stark, and D. B. Sanders.* **267**, L29, 45-D6 (1983)
- Luminous Molecular Hydrogen Emission in the Galaxy System NGC 3690-IC 694. *J. Fischer, M. Simon, J. Benson, and P. M. Solomon.* **273**, L27, 117-C13 (1983)
- SOLTAN, ANDRZEJ. The X-Ray Luminosity Function of Very Rich Clusters and the Luminosity-Richness Relation. *Andrzej Soltan and J. Patrick Henry.* **271**, 442, 94-C2 (1983)
- SOMERVILLE, W. B. Abundances of Carbon-bearing Diatomic Molecules in Diffuse Interstellar Clouds. *R. L. Dickman, W. B. Somerville, D. C. B. Whittet, D. McNally, and J. C. Blades.* **53**, 55, 17-E2 (1983) (Abstr. in **271**, 891, 99-B13)
- SONEIRA, RAYMOND M. The Galactic Spheroid. *John N. Bahcall, Maarten Schmidt, and Raymond M. Soneira.* **265**, 730, 20-F6 (1983)
- The Spatial Correlation Function of Rich Clusters of Galaxies. *Neta A. Bahcall and Raymond M. Soneira.* **270**, 20, 77-B13 (1983)
- Some Constraints on the Color-Magnitude Diagram of Giants in the Galactic Spheroid. *John N. Bahcall, Raymond M. Soneira, Donald C. Morton, and K. P. Tritton.* **272**, 627, 108-E14 (1983)
- SOONG, Y. Long-Term, Hard X-Ray Observations of Scorpius X-1 from HEAO 1. *Y. Soong and R. E. Rothschild.* **274**, 327, 127-C14 (1983)
- SPANGLER, STEVEN R. VLBI Observations of the Radio Sources 0552+398 and 1848+283: Measurements of the Departure from Equipartition. *Steven R. Spangler, Robert L. Mutel, and John M. Benson.* **271**, 44, 88-D7 (1983)
- Determination of the Properties of Magnetic Turbulence in Radio Sources. *Steven R. Spangler.* **271**, L49, 100-A8 (1983)
- Alfvén Wave Collapse and the Stability of a Relativistic Electron Beam in a Magnetized Astrophysical Plasma. *Steven R. Spangler and James P. Sheerin.* **272**, 273, 104-A3 (1983)
- SPARKE, LINDA S. Kinematics of the Optical Filaments in W50. *Tsevi Mazeh, Luis A. Aguilar, Richard R. Treffers, Arieh Königl, and Linda S. Sparke.* **265**, 235, 14-F5 (1983)
- SPENCER, J. H. 3C 395—A Quasar with Asymmetrical Radio Structure. *K. J. Johnston, J. H. Spencer, A. Witzel, and E. B. Fomalont.* **265**, L43, 26-A11 (1983)
- The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35 c$ . *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming.* **273**, L65, 123-B3 (1983)
- Circumstellar Envelope Structure of Late-Type Stars. *P. F. Bowers, K. J. Johnston, and J. H. Spencer.* **274**, 733, 133-D4 (1983)
- SPENCER, R. E. VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young.* **272**, 383, 106-A5 (1983)
- SPERGEL, D. N. Mass Loss from Evolved Stars. II. Radio Continuum Emission and Evolution to Planetary Nebulae. *D. N. Spergel, J. L. Giuliani, Jr., and G. R. Knapp.* **275**, 330, 140-E10 (1983)
- SPINRAD, H. Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wiśniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea.* **274**, 101, 125-A9 (1983)
- SPITZER, L. Interstellar Abundances of Oxygen and Nitrogen. *D. G. York, L. Spitzer, R. C. Bohlin, J. Hill, E. B. Jenkins, B. D. Savage, and T. P. Snow.* **266**, L55, 32-D8 (1983)
- SPITZER, LYMAN, JR. A Survey of Ultraviolet Interstellar Absorption Lines. *Ralph C. Bohlin, Jesse K. Hill, Edward B. Jenkins, Blair D. Savage, Theodore P. Snow, Jr., Lyman Spitzer, Jr., and Donald G. York.* **51**, 277, 6-B1 (1983) (Abstr. in **265**, 1135, 25-B11)
- SPRANGLE, PHILLIP. Electron Cyclotron Wave Acceleration Outside a Flaring Loop. *Phillip Sprangle and Loukas Vlahos.* **273**, L95, 123-D3 (1983)
- SPRESSART, B. Mass Loss in HR 1040 (A0 Ia): Analysis of Mg II  $\lambda 2802$  and H $\alpha$ . *Paul B. Kunasz, Nancy D. Morrison, and*

- B. Spessart. **266**, 739, 36-D4 (1983)
- SRAMEK, R. A. Star Bursts and the Extraordinary Galaxy NGC 3690. *R. D. Gehrz, R. A. Sramek, and D. W. Weedman*. **267**, 551, 46-G7 (1983)
- STACEY, GORDON J. Observations of the 145.5 Micron [O I] Emission Line in the Orion Nebula. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit*. **265**, L7, 18-E5 (1983)
- The Galaxy's 157 Micron [C II] Emission: Observations by Means of a Spectroscopic Lunar Occultation Technique. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit*. **268**, L99, 63-G14 (1983)
- STACHNIK, R. V. Speckle Image Reconstruction of Solar Features. *R. V. Stachnik, P. Nisenson, and R. W. Noyes*. **271**, L37, 93-C9 (1983)
- STAHLER, STEVEN W. The Equilibria of Rotating, Isothermal Clouds. I. Method of Solution. *Steven W. Stahler*. **268**, 155, 53-F5 (1983)
- The Equilibria of Rotating, Isothermal Clouds. II. Structure and Dynamical Stability. *Steven W. Stahler*. **268**, 165, 53-G1 (1983)
- Primordial Star Formation: The Role of Molecular Hydrogen. *Francesco Palla, E. E. Salpeter, and Steven W. Stahler*. **271**, 632, 96-D6 (1983)
- The Birthline for Low-Mass Stars. *Steven W. Stahler*. **274**, 822, 134-C12 (1983)
- STAMM, W. Detection of  $2 \times 10^{15}$  to  $2 \times 10^{16}$  eV Gamma-Rays from Cygnus X-3. *M. Samorski and W. Stamm*. **268**, L17, 57-B8 (1983)
- STANFORD, DARRYL. Stellar Images Derived from Rotation Broadening: AW Ursae Majoris. *Lawrence Anderson, Darryl Stanford, and Douglas Leininger*. **270**, 200, 79-B3 (1983)
- STARK, A. A. CO Emission in the Outer Galaxy between Longitudes  $50^\circ$  and  $72^\circ$ . *P. M. Solomon, A. A. Stark, and D. B. Sanders*. **267**, L29, 45-D6 (1983)
- Regions of Low Molecular Column Density Near the Galactic Plane. *F. Verter, G. R. Knapp, A. A. Stark, and R. W. Wilson*. **52**, 289, 13-D8 (1983) (Abstr. in **269**, 809, 75-C8)
- STARK, ANTONY A. Atomic Hydrogen Associated with the High-Velocity Flow in NGC 2071. *John Bally and Antony A. Stark*. **266**, L61, 32-D13 (1983)
- STARRFIELD, SUMNER G. The Discovery of Nonradial Instability Strips for Hot, Evolved Stars. *Sumner G. Starrfield, Arthur N. Cox, Stephen W. Hodson, and W. D. Pesnell*. **268**, L27, 57-C3 (1983)
- STARRFIELD, SUMNER. Theoretical Radial Pulsation Analyses of DA White Dwarfs. *Sumner Starrfield, Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy*. **269**, 645, 73-D14 (1983)
- STATLER, THOMAS. Stochastic Self-propagating Star Formation in Three-dimensional Disk Galaxy Simulations. *Thomas Statler, Neil Comins, and Bruce F. Smith*. **270**, 79, 77-G3 (1983)
- STAUFFER, JOHN. Arp 102B: A New and Unusual Broad-Line Galaxy. *John Stauffer, Rudolph Schild, and William Keel*. **270**, 465, 83-C3 (1983)
- STAUFFER, JOHN R. Observational Constraints on Galaxy-IGM Interactions in the Virgo Cluster. *John R. Stauffer*. **264**, 14, 1-B5 (1983)
- STEBBINS, ALBERT. Decay of Long-lived Particles in the Early Universe. *Joseph Silk and Albert Stebbins*. **269**, 1, 65-A6 (1983)
- STECHER, T. P. Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart*. **267**, L89, 51-B7 (1983)
- Images in the Rocket Ultraviolet: The Starburst in the Nucleus of M83. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, and T. P. Stecher*. **274**, L53, 136-A8 (1983)
- STECHER, THEODORE P. The Diffuse Interstellar Feature at 4430 Å and Interstellar Extinction in the Far-Ultraviolet. *Adolf N. Witt, Ralph C. Bohlin, and Theodore P. Stecher*. **267**, L47, 45-E8 (1983)
- STEIN, W. A. Simultaneous Visual-Infrared Polarimetry of QSOs. *J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti*. **265**, 625, 19-D6 (1983)
- STEINER, J. E. H2215-086: King of the DQ Herculis Stars. *Joseph Patterson and J. E. Steiner*. **264**, L61, 11-C2 (1983)
- Low-Ionization Active Galactic Nuclei: X-Ray or Shock Heated? *J. P. Halpern and J. E. Steiner*. **269**, L37, 76-A12 (1983)
- STEINOLFSON, R. S. Closed and Open Magnetic Fields in Stellar Winds. *D. J. Mullan and R. S. Steinolfson*. **266**, 823, 37-C14 (1983)
- Energy Dynamics in Stressed Magnetic Fields: The Filamentation and Flare Instabilities. *G. Van Hoven, R. S. Steinolfson, and T. Tachi*. **268**, 860, 62-D14 (1983)
- STELLINGWERF, R. F. HYDRA: An Implicit Partial Differential Equation, Relaxation, Stability Analysis Package. *R. F. Stellingwerf*. **271**, 876, 99-A12 (1983)
- STENDEL, R. E. The Narrow Ultraviolet Emission Lines of the Red Dwarf AU Microscopii (dM1.6e). *Thomas R. Ayres, Kjell Eriksson, Jeffrey L. Linsky, and R. E. Stencel*. **270**, L17, 80-B4 (1983)
- Observations of Two Peculiar Emission Objects in the Large Magellanic Cloud. *M. Kafatos, A. G. Michalitsianos, D. A. Allen, and R. E. Stencel*. **275**, 584, 144-A1 (1983)
- Observations of Active Chromosphere Stars. *Bernard W. Bopp, John L. Africano, R. E. Stencel, P. V. Noah, and A. Klimke*. **275**, 691, 145-B2 (1983)
- STENDEL, ROBERT E. IUE Observations of Gas Stream Effects in the Ultraviolet Spectrum of U Cephei: Erratum. *Yoji Kondo, George E. McCluskey, and Robert E. Stencel*. **264**, 746, 10-D10 (1983) (Orig. paper in **233**, 906, 103-D11)
- Coordinated Einstein and IUE Observations of a Disappearance of Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana*. **267**, 280, 43-A1 (1983)
- The Partial Phase of the Eclipse of Epsilon Aurigae. *Robert D. Chapman, Yoji Kondo, and Robert E. Stencel*. **269**, L17, 69-B3 (1983)
- The Circumstellar Envelopes and Chromospheres of Cool Giants and Supergiants. *Wendy Hagen, Robert E. Stencel, and Dale F. Dickinson*. **274**, 286, 127-A1 (1983)
- Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjørn Engvold*. **274**, 801, 134-B5 (1983)
- Spectrophotometric Observations of Symbiotic Stars and Related Objects. *William P. Blair, Robert E. Stencel, Walter A. Feibelman, and Andrew G. Michalitsianos*. **53**, 573, 24-F7 (1983) (Abstr. in **273**, 839, 122-F9)
- STERN, R. A. HEAO A-2 Soft X-Ray Source Catalog. *J. J. Nugent, K. A. Jensen, J. A. Nousek, G. P. Garmire, K. O. Mason, F. M. Walter, C. S. Bowyer, R. A. Stern, and G. R. Riegler*. **51**, 1, 1-A2 (1983) (Abstr. in **263**, 1007, 142-F8)
- STERN, ROBERT A. A Giant X-Ray Flare in the Hyades. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos*. **264**, L55, 11-B11 (1983)
- Rapid Rotation and Stellar Activity in the Triple System HD 165590. *Robert A. Stern and Andrew Skumanich*. **267**, 232, 42-D8 (1983)
- A Giant X-Ray Flare in the Hyades: Erratum. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos*. **275**, L25, 141-G9 (1983) (Orig. paper in **264**, L55, 11-B11)
- STERN, S. A. On the Global Distribution of Pluto's Atmosphere.

- L. Trafton and S. A. Stern. **267**, 872, 50-C8 (1983)
- STEVENS, MARY A. Distance to the 1.5 Millisecond Pulsar and Other 4C 21.53 Objects. *Carl Heiles, Shrinivas R. Kulkarni, Mary A. Stevens, D. C. Backer, M. M. Davis, and W. M. Goss*. **273**, L75, 123-B11 (1983)
- STEWART, GORDON C. Radiative Accretion of Intracuster Gas onto Dominant Galaxies in Poor Clusters. *Claude R. Canizares, Gordon C. Stewart, and Andrew C. Fabian*. **272**, 449, 106-F6 (1983)
- STICKLAND, D. J. Element Identifications in the Ultraviolet Spectrum of HD 101065. *G. Wegner, D. J. Cummins, P. B. Byrne, and D. J. Stickland*. **272**, 646, 108-G5 (1983)
- STOCKE, J. The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Macca-carro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger*. **266**, L73, 39-A4 (1983)
- STOCKE, JOHN. Jets from Pre-Main-Sequence Stars: AS 353A and Its Associated Herbig-Haro Objects. *Reinhard Mundt, John Stocke, and Hervey S. Stockman*. **265**, L71, 26-C13 (1983)
- Optical Study of a Possible Bipolar Flow Associated with Herbig-Haro 12. *Karen M. Strom, Stephen E. Strom, and John Stocke*. **271**, L23, 93-B7 (1983)
- STOCKE, JOHN T. The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. *John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Macca-carro, I. J. Danziger, D. Kunth, and J. Lub*. **273**, 458, 118-D12 (1983)
- STOCKMAN, H. S. Two Hot, Low-Field Magnetic DA White Dwarfs. *James Liebert, Gary D. Schmidt, Richard F. Green, H. S. Stockman, and John T. McGraw*. **264**, 262, 3-F7 (1983)
- Optical Polarimetry of Broad-Line Radio Galaxies. *Richard J. Rudy, G. D. Schmidt, H. S. Stockman, and Richard L. Moore*. **271**, 59, 88-E8 (1983)
- Identification of CW 1103+254 as a New Magnetic Variable. *H. S. Stockman, C. B. Foltz, G. D. Schmidt, and S. Tapia*. **271**, 725, 97-D5 (1983)
- Magnetism in the AM Herculis Variable CW 1103+254. *Gary D. Schmidt, H. S. Stockman, and Steven A. Grandi*. **271**, 735, 97-E1 (1983)
- STOCKMAN, HERVEY S. Jets from Pre-Main-Sequence Stars: AS 353A and Its Associated Herbig-Haro Objects. *Reinhard Mundt, John Stocke, and Hervey S. Stockman*. **265**, L71, 26-C13 (1983)
- STONE, E. C. Cosmic-Ray Abundances of Sn, Te, Xe, and Ba Nuclei Measured on HEAO 3. *W. R. Binns, R. K. Fickle, T. L. Garrard, M. H. Israel, J. Klarmann, K. E. Krombel, E. C. Stone, and C. J. Waddington*. **267**, L93, 51-B12 (1983)
- STOREY, J. W. V. Detection of Interstellar NH<sub>3</sub> in the Far-Infrared: Warm and Dense Gas in Orion-KL. *C. H. Townes, R. Genzel, Dan M. Watson, and J. W. V. Storey*. **269**, L11, 69-A12 (1983)
- STOTHERS, RICHARD. Possible Mechanisms for the Hubble-Sandage (S Doradus) Variables. *Richard Stothers and Chao-wen Chin*. **264**, 583, 8-F2 (1983)
- STOTHERS, RICHARD B. A New Calibration of the Extragalactic Distance Scale Using Cepheids and RR Lyrae Stars. *Richard B. Stothers*. **274**, 20, 124-B11 (1983)
- STRAFELLA, F. The Near-Infrared Spectrum of the Herbig Ae-Be Stars. *D. Lorenzetti, P. Saraceno, and F. Strafella*. **264**, 554, 8-C13 (1983)
- STRAZZULLA, G. Destruction of Ice Grains in T Tauri Stars. *G. Strazzulla, V. Pirronello, and G. Foti*. **271**, 255, 90-G1 (1983)
- STRINGFELLOW, GUY S. Evolutionary Effects of Helium Diffusion in Population II Stars. *Guy S. Stringfellow, Peter Bodenheimer, Peter D. Noerdlinger, and Richard J. Arigo*. **264**, 228, 3-C14 (1983)
- STRITTMATTER, PETER A. High-Resolution Spectroscopy of Selected Absorption Lines toward Quasi-stellar Objects. I. Lyman-Alpha toward PHL 957. *Frederic H. Chaffee, Jr., Ray J. Weymann, David W. Latham, and Peter A. Strittmatter*. **267**, 12, 40-B3 (1983)
- The Most Luminous Quasar: S5 0014+81. *Helmut Kühr, James W. Liebert, Peter A. Strittmatter, Gary D. Schmidt, and Craig Mackay*. **275**, L33, 148-B1 (1983)
- STROM, K. M. A Study of Low Surface Brightness Spiral Galaxies. II. Optical Surface Photometry, Infrared Photometry, and H II Region Spectrophotometry. *W. Romanishin, K. M. Strom, and S. E. Strom*. **53**, 105, 18-A10 (1983) (Abstr. in **271**, 892, 99-B14)
- The Star-forming History of the Young Cluster NGC 2264. *M. T. Adams, K. M. Strom, and S. E. Strom*. **53**, 893, 29-A11 (1983) (Abstr. in **274**, 920, 135-E1)
- STROM, KAREN M. Optical Study of a Possible Bipolar Flow Associated with Herbig-Haro 12. *Karen M. Strom, Stephen E. Strom, and John Stocke*. **271**, L23, 93-B7 (1983)
- Luminosity Distributions for Virgo Cluster Galaxies. I. Near-Infrared Surface Photometry of 81 Disk Systems. *Todd A. Boroson, Karen M. Strom, and Stephen E. Strom*. **274**, 39, 124-D2 (1983)
- STROM, RICHARD. Radio and Optical Observations of the Alleged Optical Jet in DA 240. *Wil van Breugel, Timothy Heckman, Alan Bridle, Harvey Butcher, Richard Strom, and Bruce Balick*. **275**, 61, 137-E11 (1983)
- STROM, S. E. M Supergiants and the Distance to M101. *R. M. Humphreys and S. E. Strom*. **264**, 458, 7-C9 (1983)
- A Study of Low Surface Brightness Spiral Galaxies. II. Optical Surface Photometry, Infrared Photometry, and H II Region Spectrophotometry. *W. Romanishin, K. M. Strom, and S. E. Strom*. **53**, 105, 18-A10 (1983) (Abstr. in **271**, 892, 99-B14)
- The Star-forming History of the Young Cluster NGC 2264. *M. T. Adams, K. M. Strom, and S. E. Strom*. **53**, 893, 29-A11 (1983) (Abstr. in **274**, 920, 135-E1)
- STROM, STEPHEN E. Optical Study of a Possible Bipolar Flow Associated with Herbig-Haro 12. *Karen M. Strom, Stephen E. Strom, and John Stocke*. **271**, L23, 93-B7 (1983)
- Luminosity Distributions for Virgo Cluster Galaxies. I. Near-Infrared Surface Photometry of 81 Disk Systems. *Todd A. Boroson, Karen M. Strom, and Stephen E. Strom*. **274**, 39, 124-D2 (1983)
- STRONG, A. W. Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gottwald, W. Hermesen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills*. **274**, 231, 126-C13 (1983)
- Gamma-Ray Observations toward NGC 1275, and the Origin of the Emission in the Infrared, X-Rays, and Gamma-Rays. *A. W. Strong and G. F. Bignami*. **274**, 549, 131-C6 (1983)
- STRUBLE, MITCHELL F. The Intrinsic Shape of cD Galaxies. *Christ Faclas and Mitchell F. Struble*. **274**, 521, 130-F14 (1983)
- STRUCK-MARCELL, CURTIS. Pancakes and the Formation of Galaxies in a Neutrino-dominated Universe. *Paul R. Shapiro, Curtis Struck-Marcell, and Adrian L. Melott*. **275**, 413, 142-A13 (1983)
- STRYKER, L. L. Faint Star Studies in the Magellanic Clouds. I. RICHFLD Photographic Photometry in NGC 2257. *L. L. Stryker*. **266**, 82, 27-G3 (1983)
- Stellar Spectrophotometric Atlas, 3130< $\lambda$ <10800 Å. *James E. Gunn and L. L. Stryker*. **52**, 121, 11-A11 (1983) (Abstr. in **268**, 906, 63-A9)
- SUBRAMANIAN, K. A Single Exhaust Model for Backward Emission in Doppler Quasars. *J. V. Narlikar and K. Subramanian*. **273**, 44, 112-E10 (1983)
- SUENRAM, R. D. Methanol in Orion A: Simultaneous Observations of Corresponding Rotational Transitions in the Ground and Torsionally Excited States. *J. M. Hollis, F. J. Lovas,*

- R. D. Suenram, P. R. Jewell, and L. E. Snyder. **264**, 543, 8-C2 (1983)
- Laboratory Measurement of the  $4_{u-3l}$  70 GHz Transition of Ground-State Methylene ( $\text{CH}_2$ ). F. J. Lovas, R. D. Suenram, and K. M. Evenson. **267**, L131, 51-E5 (1983)
- An Extensive Galactic Search for Conformer II Glycine. L. E. Snyder, J. M. Hollis, R. D. Suenram, F. J. Lovas, L. W. Brown, and D. Buhl. **268**, 123, 53-C3 (1983)
- SULENTIC, JACK W. Confirmation of the Luminous Connection between NGC 4319 and Markarian 205. Jack W. Sulentic. **265**, L49, 26-B2 (1983)
- On the Density of Galaxy Quartets and the Statistical Likelihood of Discordant Redshift Groups. Jack W. Sulentic. **270**, 417, 82-F5 (1983)
- SUNTZEFF, NICHOLAS B. Carbon and Nitrogen Abundances in Giant Stars of the Metal-poor Globular Cluster M15. Charles F. Trefzger, Duane F. Carbon, G. E. Langer, Nicholas B. Suntzeff, and Robert P. Kraft. **266**, 144, 28-E6 (1983)
- SUTHERLAND, P. G. On Searches for Pulsed Emission with Application to Four Globular Cluster X-Ray Sources: NGC 1851, 6441, 6624, and 6712. D. A. Leahy, W. Darbro, R. F. Elsner, M. C. Weisskopf, P. G. Sutherland, S. Kahn, and J. E. Grindlay. **266**, 160, 28-F9 (1983)
- X-Ray Observations of 4U 1626-67 by the Monitor Counter on the Einstein (HEAO 2) Observatory. R. F. Elsner, W. Darbro, D. Leahy, M. C. Weisskopf, P. G. Sutherland, S. M. Kahn, and J. E. Grindlay. **266**, 769, 36-F6 (1983)
- The Period History of the X-Ray Pulsar in MSH 15-52. M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Narayan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward. **267**, 711, 48-E5 (1983)
- The Type I Supernova 1981b in NGC 4536: The First 100 Days. David Branch, C. H. Lacy, Marshall L. McCall, P. G. Sutherland, A. Uomoto, J. C. Wheeler, and B. J. Wills. **270**, 123, 78-C9 (1983)
- X-Ray Observations of LMC X-3 with the Monitor Proportional Counter aboard the HEAO 2 Einstein Observatory: A Comparison with Cygnus X-1. M. C. Weisskopf, S. M. Kahn, W. D. Darbro, R. F. Elsner, J. E. Grindlay, S. Narayan, P. G. Sutherland, and A. C. Williams. **274**, L65, 136-B7 (1983)
- SUTTON, E. C. The Distribution of the CO  $J = 2-1$  Emission from M82. E. C. Sutton, C. R. Masson, and T. G. Phillips. **275**, L49, 148-C2 (1983)
- SUZUKI, HIROKO. Synthesis of Chain Molecules in Regions with Partially Ionized Carbon. Hiroko Suzuki. **272**, 579, 108-B8 (1983)
- SVENSSON, ROLAND. The Thermal Pair Annihilation Spectrum: A Detailed Balance Approach. Roland Svensson. **270**, 300, 80-B11 (1983)
- SWANK, J. Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. M. Garcia, S. L. Balunas, R. Duxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson. **267**, 291, 43-A13 (1983)
- SWANK, J. H. X-Ray Properties of the Be/X-Ray System 2S 0114+650 = LSI +65°010. G. Koenigsberger, J. H. Swank, A. E. Szymkowiak, and N. E. White. **268**, 782, 61-F4 (1983)
- The X-Ray Absorption Spectrum of 4U 1700-37 and Its Implications for the Stellar Wind of the Companion HD 153919. N. E. White, T. R. Kallman, and J. H. Swank. **269**, 264, 68-A13 (1983)
- Accretion Powered X-Ray Pulsars. N. E. White, J. H. Swank, and S. S. Holt. **270**, 711, 85-G7 (1983)
- X-Ray Spectra of Orion OB Supergiants. Joseph P. Cassinelli and J. H. Swank. **271**, 681, 97-A1 (1983)
- SWIGART, A. V. Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Swigart. **267**, L89, 51-B7 (1983)
- SWIGART, ALLEN V. Effects of Core Perturbations on the Structure of the Sun. Allen V. Swigart. **273**, 795, 122-C4 (1983)
- SZALAY, A. S. The Peculiar Velocity Field in Flattened Superclusters. A. S. Szalay and Joseph Silk. **264**, L31, 11-A4 (1983)
- The Collisionless Damping of Density Fluctuations in an Expanding Universe. J. R. Bond and A. S. Szalay. **274**, 443, 130-A5 (1983)
- SZTAJNO, M. X-Ray Burst Observations of Serpens X-1. M. Sztajno, E. M. Basinska, L. R. Cominsky, F. J. Marshall, and W. H. G. Lewin. **267**, 713, 48-E7 (1983)
- SZYMKOWIAK, A. E. X-Ray Properties of the Be/X-Ray System 2S 0114+650 = LSI +65°010. G. Koenigsberger, J. H. Swank, A. E. Szymkowiak, and N. E. White. **268**, 782, 61-F4 (1983)
- G29.7-0.3: Another Supernova Remnant with an Identity Crisis. R. H. Becker, D. J. Helfand, and A. E. Szymkowiak. **268**, L93, 63-F9 (1983)
- TAAM, RONALD E. Angular Momentum Loss and the Evolution of Cataclysmic Binaries. Ronald E. Taam. **268**, 361, 55-G6 (1983)
- The Evolution of a Stripped Giant-Neutron Star Binary. Ronald E. Taam. **270**, 694, 85-F4 (1983)
- TACCONI, LINDA J. CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville. **269**, 136, 66-E5 (1983)
- TACHI, T. Energy Dynamics in Stressed Magnetic Fields: The Filamentation and Flare Instabilities. G. Van Hoven, R. S. Steinolfson, and T. Tachi. **268**, 860, 62-D14 (1983)
- TAFF, L. G. Stability Limits for "Isothermal" Cores in Globular Cluster Models: Two-Component Systems. J. Katz and L. G. Taff. **264**, 476, 7-E2 (1983)
- TAKADA, MASAHIRO. The Resonance Lines of Aluminum in IUE Spectra of B-Type Chemically Peculiar Stars. Kozo Sadakane, Masahide Takada, and Jun Jugaku. **274**, 261, 126-F2 (1983)
- TAKAHASHI, TAKAMASA.  $\text{H}_2\text{O}$  Heating in Molecular Clouds: Line Transfer and Thermal Balance in a Warm Dust? Medium. Takamasa Takahashi, David J. Hollenbach, and Joseph Silk. **275**, 145, 138-E14 (1983)
- TAKAKURA, T. Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the Hinotori Satellite. T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto. **270**, L83, 87-D11 (1983)
- TALON, R. Multispacecraft Hard X-Ray Observations of Fine Time Structure in Two Solar Flares. K. Hurley, M. Niel, R. Talon, I. V. Estulin, and V. Ch. Dolidze. **265**, 1076, 24-E1 (1983)
- TAN, L. C. Prediction of Interstellar Antiproton Flux Using a Nonuniform Galactic Disk Model. L. C. Tan and L. K. Ng. **269**, 751, 74-F6 (1983)
- TANAKA, Y. see also LAWRENCE, A., et al
- TANAKA, Y. Observations of Centaurus X-3 by Hakucho. T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- TANANBAUM, H. X-Ray Studies of Quasars with the Einstein



- Observatory*. III. The 3CR Sample. *H. Tananbaum, J. F. C. Wardle, G. Zamorani, and Y. Avni*. **268**, 60, 52-E9 (1983)
- Analysis of Complete Quasar Samples to Obtain Parameters of Luminosity and Evolution Functions. *H. L. Marshall, Y. Avni, H. Tananbaum, and G. Zamorani*. **269**, 35, 65-D2 (1983)
- Optical and X-Ray Observations of Faint Quasars in an Optically Selected Sample. *H. L. Marshall, H. Tananbaum, G. Zamorani, J. P. Huchra, A. Braccisi, and V. Zitelli*. **269**, 42, 65-D9 (1983)
- TANDBERG-HANSEN, E. Induced Mass and Wave Motions in the Lower Solar Atmosphere. I. Effects of Shear Motion of Flux Tubes. *S. T. Wu, Y. Q. Hu, Y. Nakagawa, and E. Tandberg-Hanssen*. **266**, 866, 37-G1 (1983)
- TANZI, E. G. Ultraviolet Spectroscopy of V1341 Cygni (= Cygnus X-2). *L. Chiappetti, L. Maraschi, E. G. Tanzi, and A. Treves*. **265**, 354, 16-A5 (1983)
- X-Ray and UV Observations of the BL Lacertae Object 3C 66A. *D. Maccagni, L. Maraschi, E. G. Tanzi, M. Tarengi, and L. Chiappetti*. **273**, 75, 113-A1 (1983)
- TANZI, ENRICO. Infrared Observations of R136, the Central Object of the 30 Doradus Nebula. *Nino Panagia, Enrico G. Tanzi, and Massimo Tarengi*. **272**, 123, 102-D4 (1983)
- TAPIA, S. Identification of CW 1103+254 as a New Magnetic Variable. *H. S. Stockman, C. B. Foltz, G. D. Schmidt, and S. Tapia*. **271**, 725, 97-D5 (1983)
- TARAFDAR, SHANKAR P. Dependence of Interstellar Depletion on Hydrogen Column Density: Possibilities and Implications. *Shankar P. Tarafdar, Sheo S. Prasad, and Wesley T. Huntress, Jr.* **267**, 156, 41-E13 (1983)
- UV Radiation Field inside Dense Clouds: Its Possible Existence and Chemical Implications. *Sheo S. Prasad and Shankar P. Tarafdar*. **267**, 603, 47-D5 (1983)
- TARASICK, DAVID. Diffusion, Meridional Circulation, and Mass Loss in Fm-Am Stars. *Georges Michaud, David Tarasick, Yves Charland, and Claude Pelletier*. **269**, 239, 67-F14 (1983)
- TARBELL, THEODORE D. The Rotation of Horizontal-Branch Stars. I. Members of the Field. *Ruth C. Peterson, Theodore D. Tarbell, and Bruce W. Carney*. **265**, 972, 23-D6 (1983)
- TARENGI, M. Optical Candidates for the 1978 November 19 Gamma-Ray Burst Source. *H. Pedersen, C. Motch, M. Tarengi, J. Danziger, G. Pizzichini, and W. H. G. Lewin*. **270**, 143, 87-A14 (1983)
- X-Ray and UV Observations of the BL Lacertae Object 3C 66A. *D. Maccagni, L. Maraschi, E. G. Tanzi, M. Tarengi, and L. Chiappetti*. **273**, 75, 113-A1 (1983)
- TARENGI, MASSIMO. Infrared Observations of R136, the Central Object of the 30 Doradus Nebula. *Nino Panagia, Enrico G. Tanzi, and Massimo Tarengi*. **272**, 123, 102-D4 (1983)
- The X-Ray Spectra of the BL Lacertae Objects PKS 0548-322 and 3C 66A. *Dario Maccagni, Tommaso Maccacaro, and Massimo Tarengi*. **273**, 70, 112-G8 (1983)
- TASSOUL, JEAN-LOUIS. Meridional Circulation of Rotating Stars. IV. The Approach to the Mean Steady State in Early-Type Stars. *Jean-Louis Tassoul and Monique Tassoul*. **264**, 298, 4-B3 (1983)
- Meridional Circulation in Rotating Stars. V. Cooling White Dwarfs. *Monique Tassoul and Jean-Louis Tassoul*. **267**, 334, 43-E2 (1983)
- Meridional Circulation in Rotating Stars. VI. The Effects of Anisotropic Eddy Viscosity. *Monique Tassoul and Jean-Louis Tassoul*. **271**, 315, 91-D6 (1983)
- TASSOUL, M. The Pulsation Properties of DB White Dwarfs: A Preliminary Analysis. *D. E. Winget, H. M. Van Horn, M. Tassoul, C. J. Hansen, and G. Fontaine*. **268**, L33, 57-C10 (1983)
- TASSOUL, MONIQUE. Meridional Circulation of Rotating Stars. IV. The Approach to the Mean Steady State in Early-Type Stars. *Jean-Louis Tassoul and Monique Tassoul*. **264**, 298, 4-B3 (1983)
- Meridional Circulation in Rotating Stars. V. Cooling White Dwarfs. *Monique Tassoul and Jean-Louis Tassoul*. **267**, 334, 43-E2 (1983)
- Meridional Circulation in Rotating Stars. VI. The Effects of Anisotropic Eddy Viscosity. *Monique Tassoul and Jean-Louis Tassoul*. **271**, 315, 91-D6 (1983)
- TAWARA, Y. *see also* LAWRENCE, A., *et al*
- TAWARA, Y. Observations of Centaurus X-3 by Hakucho. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo*. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo*. **267**, 310, 43-C6 (1983)
- TAYLOR, J. H. An Upper Limit on the Stochastic Background of Ultralow-Frequency Gravitational Waves. *R. W. Romani and J. H. Taylor*. **265**, L35, 26-A4 (1983)
- Further Observations of the Long-Period Binary Pulsar PSR 0820+02. *R. N. Manchester, Lynette M. Newton, D. J. Cooke, P. R. Backus, M. Damashek, J. H. Taylor, and J. J. Condon*. **268**, 832, 62-B14 (1983)
- TEAYS, TERRY J. The Structural Properties of Cepheid Velocity Curves. *Norman R. Simon and Terry J. Teays*. **265**, 996, 23-F2 (1983)
- TEEGARDEN, B. J. Hard X-Ray Observations of the Crab Nebula and A0535+26 with a High Energy Resolution Spectrometer. *J. M. Hameury, D. Boclet, Ph. Durouchoux, T. L. Cline, W. S. Paciesas, B. J. Teggarden, J. Tueller, and R. C. Haymes*. **270**, 144, 78-D14 (1983)
- TEGNÉR, P. E. The Rate of the  ${}^3\text{He}(p, e^+ \nu){}^4\text{He}$  Reaction. *P. E. Tegnér and Chr. Bargholtz*. **272**, 311, 104-C13 (1983)
- TELESCO, C. M. The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams*. **274**, 168, 125-F6 (1983)
- TENNANT, ALLYN F. The Absence of Rapid X-Ray Variability in Active Galaxies. *Allyn F. Tennant and R. F. Mushotzky*. **264**, 92, 2-A1 (1983)
- TERASAWA, T. On the Drift Mechanism for Energetic Charged Particles at Shocks. *G. M. Webb, W. I. Axford, and T. Terasawa*. **270**, 537, 84-A10 (1983)
- TERRELL, J. Observations of Two Gamma-Ray Bursts by Vela X-Ray Detectors: Erratum. *J. Terrell, E. E. Fenimore, R. W. Klebesadel, and U. D. Desai*. **269**, 806, 75-C5 (1983) (Orig. paper in **254**, 279, 29-A12)
- Evidence for an ~300 Day Period in Cygnus X-1. *W. C. Priedhorsky, J. Terrell, and S. S. Holt*. **270**, 233, 79-D10 (1983)
- Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. *J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radostitz, W. C. Priedhorsky, J. Terrell, and E. N. Walker*. **271**, L65, 100-B8 (1983)
- Long-Term X-Ray Observations of Centaurus X-3, GX 301-2 (4U 1223-62), GX 304-1 (4U 1258-61), and 4U 1145-61. *W. C. Priedhorsky and J. Terrell*. **273**, 709, 121-C14 (1983)
- TERZIAN, YERVANT. Interpretation of Neutral Hydrogen Spin Temperature Measurements. *H. E. Payne, E. E. Salpeter, and Yervant Terzian*. **272**, 540, 107-F9 (1983)
- Discovery of a Large Intergalactic H I Cloud in the M96 Group. *Stephen E. Schneider, George Helou, Edwin E. Salpeter, and Yervant Terzian*. **273**, L1, 117-B2 (1983)
- Planetary Nebulae and the Galactic Rotation Curve. *Stephen*

- E. Schneider and Yervant Terzian. **274**, L61, 136-B3 (1983)  
Radial Velocities of Planetary Nebulae. Stephen E. Schneider, Yervant Terzian, A. Purgathofer, and M. Perinotto. **52**, 399, 15-G5 (1983) (Abstr. in **270**, 779, 86-E6)
- TEUKOLSKY, SAUL A. Multiscale Model Equations for Turbulent Convection and Convective Overshoot. Philip S. Marcus, William H. Press, and Saul A. Teukolsky. **267**, 795, 49-D12 (1983)  
Implications of the Millisecond Pulsar for Neutron Star Models. Stuart L. Shapiro, Saul A. Teukolsky, and Ira Wasserman. **272**, 702, 109-D10 (1983)
- THADDEUS, P. Laboratory and Astronomical Measurement of the Millimeter Wave Spectrum of the Ethynyl Radical CCH. C. A. Gottlieb, E. W. Gottlieb, and P. Thaddeus. **264**, 740, 10-D4 (1983)  
The Kinetic Temperature and Density of the Sagittarius Molecular B2 Cloud from Observations of Methyl Cyanide. Sally E. Cummins, Sheldon Green, P. Thaddeus, and R. A. Linke. **266**, 331, 30-E4 (1983)  
A Large Molecular Cloud toward the SNR W50 and SS 433. Y.-L. Huang, T. M. Dame, and P. Thaddeus. **272**, 609, 108-D10 (1983)  
Laboratory Detection of the  $C_2N$  and  $C_2H$  Free Radicals. C. A. Gottlieb, E. W. Gottlieb, P. Thaddeus, and H. Kawamura. **275**, 916, 147-E3 (1983)
- THIELEMAN, F.-K. Neutron Capture Rates in the  $r$ -Process: The Role of Direct Radiative Capture. G. J. Mathews, A. Mengoni, F.-K. Thielemann, and William A. Fowler. **270**, 740, 86-B8 (1983)
- THOMAS, ROGER J. A Search for X-Rays from Runaway Stars. C. Krishna Kumar, Timothy R. Kallman, and Roger J. Thomas. **272**, 219, 103-D5 (1983)
- THOMPSON, D. T. The Albedo of Uranus. G. W. Lockwood, B. L. Lutz, D. T. Thompson, and A. Warnock III. **266**, 402, 31-C6 (1983)
- THOMPSON, I. B. The Polarization of Seyfert Galaxies. P. G. Martin, I. B. Thompson, J. Maza, and J. R. P. Angel. **266**, 470, 33-D10 (1983)
- THOMPSON, IAN. The Wavelength Dependence of Interstellar Polarization in the Large Magellanic Cloud. Geoffrey C. Clayton, P. G. Martin, and Ian Thompson. **265**, 194, 14-C3 (1983)  
The Magnetic Fields of the Helium-weak B Stars. Ermanno F. Borra, J. D. Landstreet, and Ian Thompson. **53**, 151, 18-D13 (1983) (Abstr. in **271**, 894, 99-C2)
- THOMPSON, LAIRD A. Markarian Galaxies and Voids in the Galaxy Distribution. Laird A. Thompson. **266**, 446, 33-B12 (1983)
- THOMPSON, RODGER I. Infrared Spectroscopy of the Sources in S235 and Its Implication for the Line Excess Problem. Rodger I. Thompson, Harley A. Thronson, Jr., and Bel Campbell. **266**, 614, 35-A6 (1983)
- THORSTENSEN, J. R. The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae). G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen. **266**, 806, 37-B10 (1983)
- THRONSON, HARLEY A., JR. High-Resolution Near-Infrared and Millimeter-Wave Spectroscopy of NGC 7027. Harley A. Thronson, Jr. **264**, 599, 8-G5 (1983)  
Infrared Spectroscopy of the Sources in S235 and Its Implication for the Line Excess Problem. Rodger I. Thompson, Harley A. Thronson, Jr., and Bel Campbell. **266**, 614, 35-A6 (1983)  
The M17 SW Molecular Cloud. Harley A. Thronson, Jr. and Charles J. Lada. **269**, 175, 67-A4 (1983)  
Carbon Monoxide Emission from Planetary Nebulae and Their Possible Precursors. Harley A. Thronson, Jr. and David Mozurkewich. **271**, 611, 96-B12 (1983)  
Far-Infrared and Submillimeter Observations of Stellar Radiative and Wind Heating in S140 IRS. P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles. **271**, 625, 96-C13 (1983)
- Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith. **274**, 571, 131-E1 (1983)
- THUAN, T. X. The QSO 1156+295: A Multifrequency Study of Recent Activity. Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- THUAN, TRINH X. Blue Compact Dwarf Galaxies. II. Near-Infrared Studies and Stellar Populations. Trinh X. Thuan. **268**, 667, 60-D11 (1983)  
A Multifrequency Study of Star Formation in the Blue Compact Dwarf Galaxy I Zw 36. F. Viallefond and Trinh X. Thuan. **269**, 444, 71-C11 (1983)  
Einstein X-Ray Observations of Optical-Radio Selected Areas. P. Kaigert, Trinh X. Thuan, and Rogier A. Windhorst. **275**, 1, 137-A6 (1983)
- TIELENS, A. G. G. M. Stationary Flows in the Circumstellar Envelopes of M Giants. A. G. G. M. Tielens. **271**, 702, 97-B10 (1983)
- TIFFT, W. G. Redshift Quantization in Compact Groups of Galaxies. W. J. Cocke and W. G. Tifft. **268**, 56, 52-E5 (1983)
- TIMOTHY, J. G. The Depletion of Calcium in the Rho Ophiuchi Cloud. Theodore P. Snow, J. G. Timothy, and C. G. Seab. **265**, L67, 26-C10 (1983)  
Observations of Of-Star Wind Variability. C. A. Grady, T. P. Snow, Jr., and J. G. Timothy. **271**, 691, 97-A13 (1983)
- TIWARY, S. N. Oscillator Strengths of  $3p^33d^2D \rightarrow 3p^33d4s^2P^o$ ,  $3D^o$ ,  $2F^o$  Transitions in Cr VI, Mn VII, and Fe VIII. S. N. Tiwary. **269**, 803, 75-C2 (1983)  
Oscillator Strengths of  $3p^33d^2D \rightarrow 3p^33d4s^2P^o$ ,  $2F^o$  Transitions in Co IX, Cu XI, and Zn XII Ions. S. N. Tiwary. **272**, 781, 110-C6 (1983)
- TOHLIN, JOEL E. Preferred Orbit Planes in the Gravitational Field of a Tumbling Spheroidal Galaxy. Richard H. Durisen, Joel E. Tohline, Joseph A. Burns, and Anthony R. Dobrovolskis. **264**, 392, 6-E9 (1983)  
Estimating the Tumble Rates of Galaxy Halos. Gregory F. Simonson and Joel E. Tohline. **268**, 638, 60-B10 (1983)
- TOKUNAGA, A. T. The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams. **274**, 168, 125-F6 (1983)
- TOLLER, GARY N. The Extragalactic Background Light at 4400 Å. Gary N. Toller. **266**, L79, 39-A9 (1983)
- TOMISAKA, KOHJI. The Structure and Expansion Law of a Shock Wave in an Expanding Universe. Satoru Ikeuchi, Kohji Tomisaka, and Jeremiah P. Ostriker. **265**, 583, 19-A5 (1983)
- TOMKIN, JOCELYN. Evidence of Non-LTE in Photospheric Lines of G and K Giants. Jeffery A. Brown, Jocelyn Tomkin, and David L. Lambert. **265**, L93, 26-E6 (1983)  
Secondaries of Eclipsing Binaries. V. EK Cephei. Jocelyn Tomkin. **271**, 717, 97-C11 (1983)  
Heavy-Element Abundances in the Classical Barium Star HR 774. Jocelyn Tomkin and David L. Lambert. **273**, 722, 121-D14 (1983)
- TONRY, JOHN. A Survey of Galaxy Redshifts. IV. The Data. John Huchra, Marc Davis, David Latham, and John Tonry. **52**, 39, 10-D11 (1983) (Abstr. in **268**, 906, 63-A9)
- TONRY, JOHN L. Anisotropic Velocity Dispersions in Spherical

- Galaxies. *John L. Tonry*. **266**, 58, 27-E7 (1983)
- TORNAMBÉ, A. On the Evolution of Massive Zero-Metal Stars. *V. Castellani, A. Chieffi, and A. Tornambé*. **272**, 249, 103-F7 (1983)
- TORRELLES, JOSÉ M. Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? *José M. Torrelles, Luis F. Rodríguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho*. **274**, 214, 126-B10 (1983)
- TOWNES, C. H. Small Rotating Clouds of Stellar Mass in Orion Molecular Cloud 1. *Andrew Harris, C. H. Townes, D. N. Matsakis, and Patrick Palmer*. **265**, L63, 26-C6 (1983)
- Detection of Interstellar  $\text{NH}_3$  in the Far-Infrared: Warm and Dense Gas in Orion-KL. *C. H. Townes, R. Genzel, Dan M. Watson, and J. W. V. Storey*. **269**, L11, 69-A12 (1983)
- TRAFTON, L. On the Global Distribution of Pluto's Atmosphere. *L. Trafton and S. A. Stern*. **267**, 872, 50-C8 (1983)
- TREFFERS, RICHARD R. Kinematics of the Optical Filaments in W50. *Tsevi Mazeh, Luis A. Aguilar, Richard R. Treffers, Arieh König, and Linda S. Sparke*. **265**, 235, 14-F5 (1983)
- Galactic Ring Nebulae Associated with Wolf-Rayet Stars. VIII. Summary and Atlas. *You-Hua Chu, Richard R. Treffers, and Karen B. Kwitter*. **53**, 937, 29-F8 (1983) (Abstr. in **274**, 923, 135-E4)
- TREFZGER, CHARLES F. Carbon and Nitrogen Abundances in Giant Stars of the Metal-poor Globular Cluster M15. *Charles F. Trefzger, Duane F. Carbon, G. E. Langer, Nicholas B. Suntzeff, and Robert P. Kraft*. **266**, 144, 28-E6 (1983)
- TREMAINE, SCOTT. Numerical Simulations of the Decay of Satellite Galaxy Orbits. *D. N. C. Lin and Scott Tremaine*. **264**, 364, 6-C9 (1983)
- The Riemann Disks. I. Equilibrium and Secular Evolution. *Martin D. Weinberg and Scott Tremaine*. **271**, 586, 96-A1 (1983)
- TREUMANN, RUDOLF A. The Fiber Fine Structure during Solar Type IV Radio Bursts: Observations and Theory of Radiation in Presence of Localized Whistler Turbulence. *Thomas E. X. Bernold and Rudolf A. Treumann*. **264**, 677, 9-F4 (1983)
- TREVES, A. Ultraviolet Spectroscopy of V1341 Cygni (=Cygnus X-2). *L. Chiappetti, L. Maraschi, E. G. Tanzi, and A. Treves*. **265**, 354, 16-A5 (1983)
- TRINCHIERI, G. X-Ray Observations of the Antennae (NGC 4038/39). *G. Fabbiano and G. Trinchieri*. **266**, L5, 32-A5 (1983)
- Radio and X-Ray Observations of the Radio Halo Source in A1367. *G. Gavazzi and G. Trinchieri*. **270**, 410, 82-E12 (1983)
- TRITTON, K. P. Some Constraints on the Color-Magnitude Diagram of Giants in the Galactic Spheroid. *John N. Bahcall, Raymond M. Soneira, Donald C. Morton, and K. P. Tritton*. **272**, 627, 108-E14 (1983)
- TROTTER, G. The Association of Radio Noise Storm Enhancements with the Appearance of Additional Material in the Corona. *A. Kerdran, M. Pick, G. Trotter, C. Sawyer, R. Illing, W. Wagner, and L. House*. **265**, L19, 18-F1 (1983)
- TRURAN, J. W. Explosive Helium Burning in Supernovae: A Source of  $r$ -Process Elements. *J. J. Cowan, A. G. W. Cameron, and J. W. Truran*. **265**, 429, 16-F11 (1983)
- TRURAN, JAMES W. On the Evolution of Those Nuclei of Planetary Nebulae That Experience a Final Helium Shell Flash. *Icko Iben, Jr., James B. Kaler, James W. Truran, and Alvio Renzini*. **264**, 605, 9-A1 (1983)
- The Outbursts of Symbiotic Novae. *Scott J. Kenyon and James W. Truran*. **273**, 280, 115-C10 (1983)
- TSAO, C. H. Proton-Nucleus Total Inelastic Cross Sections: An Empirical Formula for  $E > 10$  MeV. *John R. Letaw, R. Silberberg, and C. H. Tsao*. **51**, 271, 6-A2 (1983) (Abstr. in **265**, 1136, 25-B12)
- TSIKOUDI, VASSILIKI. *HEAO 1* Observations of Quiescent X-Ray Emission from Flare Stars: Erratum. *Vassiliki Tsiikoudi*. **272**, 381, 105-B8 (1983) (Orig. paper in **262**, 263, 124-A1)
- TSUNEMI, H. *see also* LAWRENCE, A., *et al*
- TSUNEMI, H. Observations of Centaurus X-3 by *Hakucho*. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo*. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo*. **267**, 310, 43-C6 (1983)
- TSUNETA, S. Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the *Hinotori* Satellite. *T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto*. **270**, L83, 87-D11 (1983)
- TSUNO, K. Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). *K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo*. **267**, 310, 43-C6 (1983)
- TUCHMAN, Y. The Luminosity-Core Mass Relation: Why and How. *Y. Tuchman, A. Glasner, and Z. Barkat*. **268**, 356, 55-G1 (1983)
- TUCKER, W. The X-Ray Morphology of Abell 1367. *J. Bechtold, W. Forman, R. Giacconi, C. Jones, J. Schwarz, W. Tucker, and L. Van Speybroeck*. **265**, 26, 12-C7 (1983)
- The Mass of Tycho's Supernova Remnant as Determined from a High-Resolution X-Ray Map. *F. Seward, P. Gorenstein, and W. Tucker*. **266**, 287, 30-A14 (1983)
- TUCKER, W. H. The Relationship between the X-Ray and Optical Luminosities for QSOs. *W. H. Tucker*. **271**, 531, 95-C8 (1983)
- TUCKER, WALLACE H. Thermal Conduction and Heating by Non-thermal Electrons in the X-Ray Halo of M87. *Wallace H. Tucker and Robert Rosner*. **267**, 547, 46-G3 (1983)
- TUELLER, J. Hard X-Ray Observations of the Crab Nebula and A0535+26 with a High Energy Resolution Spectrometer. *J. M. Hameury, D. Boclet, Ph. Durouchoux, T. L. Cline, W. S. Paciesas, B. J. Teegarden, J. Tueller, and R. C. Haymes*. **270**, 144, 78-D14 (1983)
- TUFFS, R. Discovery of a Redshift  $z = 1.2$  Quasar with a Flat Radio Spectrum in the Field of the Gamma-Ray Source CG 195+04. *A. F. J. Moffat, R. Schlickeiser, M. M. Shara, W. Sieber, R. Tuffs, and H. Kühr*. **271**, L45, 100-A4 (1983)
- TUOHY, I. Linear Polarization Measurements of the AM Herculis Objects H0139-68 and E1405-451. *N. Visvanathan and I. Tuohy*. **275**, 709, 145-C6 (1983)
- TUOHY, I. R. The Central X-Ray Source in RCW 103: Evidence for Blackbody Emission. *I. R. Tuohy, G. P. Garmire, R. N. Manchester, and M. A. Dopita*. **268**, 778, 61-E14 (1983)
- Supernova Remnants in the Magellanic Clouds. *D. S. Mathewson, V. L. Ford, M. A. Dopita, I. R. Tuohy, K. S. Long, and David J. Helfand*. **51**, 345, 7-F1 (1983) (Abstr. in **266**, 902, 38-B11)
- TUOHY, IAN R. Ring Ejection in Type II Supernovae: IE 0102.2-7219 in the Small Magellanic Cloud. *Ian R. Tuohy and Michael A. Dopita*. **268**, L11, 57-A11 (1983)
- TUPPER, B. O. J. Zero-Curvature Friedmann-Robertson-Walker Models as Exact Viscous Magnetohydrodynamic Cosmologies. *A. A. Coley and B. O. J. Tupper*. **271**, 1, 88-A6 (1983)
- TURNER, EDWIN L. Filamentary Galaxy Clustering: A Mapping Algorithm. *J. E. Moody, Edwin L. Turner, and J. Richard Gott III*. **273**, 16, 112-B7 (1983)
- TURNER, J. L. VLA Observations of Massive Star Formation in Spiral Nuclei. *J. L. Turner and P. T. P. Ho*. **268**, L79, 63-

- E10 (1983)
- TURNER, P. J. Direct Evidence of Type III Electron Streams Propagating in Coronal Streamers. *M. R. Kundu, T. E. Gergely, P. J. Turner, and R. A. Howard*. **269**, L67, 76-C11 (1983)
- TWAROG, BRUCE A. NGC 752 and Main-Sequence Bimodality. *Bruce A. Twarog*. **267**, 207, 42-B10 (1983)
- Faint Stellar Photometry in Clusters. I. NGC 2204 and E3. *Jay A. Frogel and Bruce A. Twarog*. **274**, 270, 126-F11 (1983)
- TYSON, J. A. Alignment of Faint Galaxy Images: Cosmological Distortion and Rotation. *F. Valdes, J. A. Tyson, and J. F. Jarvis*. **271**, 431, 94-B5 (1983)
- Expected Number of Multiple QSOs from Galaxy and QSO Surface Density Data. *J. A. Tyson*. **272**, L41, 111-A4 (1983)
- TYSON, J. ANTHONY. Optical Emission in the Radio Lobes of Radio Galaxies. II. New Observations of 25 Radio Lobes. *Philippe Crane, J. Anthony Tyson, and William C. Saslaw*. **265**, 681, 20-B3 (1983)
- UKITA, NOBUHARU. SiO Isotopic Maser Emission from VY Canis Majoris. *S. Deguchi, J. Good, Y. Fan, X. Mao, D. Wang, and Nobuharu Ukita*. **264**, L65, 11-C8 (1983)
- ULMER, M. P. A Survey by HEAO 1 of Clusters of Galaxies. III. The Complete Abell Catalog. *M. W. Johnson, R. G. Cruddace, M. P. Ulmer, M. P. Kowalski, and K. S. Wood*. **266**, 425, 33-A5 (1983)
- Redshift Modifications to HEAO A-1 Cluster X-Ray Luminosities. *M. P. Kowalski, M. P. Ulmer, and R. G. Cruddace*. **268**, 540, 59-A1 (1983)
- The Discovery of an X-Ray Bright BL Lacertae Object: 0414+009. *M. P. Ulmer, Robert L. Brown, D. A. Schwartz, J. Patterson, and R. G. Cruddace*. **270**, L1, 81-A2 (1983)
- ULRICH, M. H. The Ultraviolet Spectrum of the Seyfert Galaxies NGC 3516 and NGC 5548. *M. H. Ulrich and C. Boisson*. **267**, 515, 46-D13 (1983)
- ULRICH, ROGER K. Testing Solar Models with Global Solar Oscillations in the 5-Minute Band. *Roger K. Ulrich and Edward J. Rhodes, Jr.* **265**, 551, 18-A10 (1983)
- Spectral Energy Distributions of Young Stellar Objects. I. A Turbospheric Model for DR Tauri. *Roger K. Ulrich, Allen W. Shafter, George Hawkins, and Gillian Knapp*. **267**, 199, 42-B2 (1983)
- ULVESTAD, J. S. The Arc Second Radio Structure of 12 BL Lacertae Objects. *J. S. Ulvestad, K. J. Johnston, and K. W. Weiler*. **266**, 18, 27-B9 (1983)
- Radio Jets and High-Velocity Gas in the Seyfert Galaxy NGC 1068. *A. S. Wilson and J. S. Ulvestad*. **275**, 8, 137-A14 (1983)
- ULVESTAD, JAMES S. The Nuclear Radio Source of the X-Ray Galaxy NGC 2110. *James S. Ulvestad and Andrew S. Wilson*. **264**, L7, 5-A8 (1983)
- UNDERHILL, ANNE B. An Alternative Model for the Atmospheres of Wolf-Rayet and O Stars. *Anne B. Underhill*. **265**, 933, 23-A9 (1983)
- The Angular Diameters, Effective Temperatures, Radii, and Luminosities of 10 Wolf-Rayet Stars. *Anne B. Underhill*. **266**, 718, 36-B10 (1983)
- Possible Evidence for the Driving of the Winds of Hot Stars by Alfvén Waves. *Anne B. Underhill*. **268**, L127, 64-B1 (1983)
- UNDERWOOD, JAMES H. A Giant X-Ray Flare in the Hyades. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos*. **264**, L55, 11-B11 (1983)
- A Giant X-Ray Flare in the Hyades: Erratum. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos*. **275**, L25, 141-G9 (1983) (Orig. paper in **264**, L55, 11-B11)
- UNWIN, S. C. Rectilinear Motions in 3C 345. *M. H. Cohen, S. C. Unwin, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **269**, L1, 69-A3 (1983)
- Superluminal Motion in the Quasar 3C 345. *S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **271**, 536, 95-C13 (1983)
- VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young*. **272**, 383, 106-A5 (1983)
- UOMOTO, A. The Type I Supernova 1981b in NGC 4536: The First 100 Days. *David Branch, C. H. Lacy, Marshall L. McCall, P. G. Sutherland, A. Uomoto, J. C. Wheeler, and B. J. Wills*. **270**, 123, 78-C9 (1983)
- UPGREN, A. R. A Catalog of Spectral Classification and Photometry of Barium Stars. *P. K. Lü, D. W. Dawson, A. R. Upgren, and E. W. Weis*. **52**, 169, 11-E11 (1983) (Abstr. in **268**, 905, 63-A8)
- USHER, PETER D. Low Frequency Asymptotic Spectra of Multiple, Decelerating Adiabatic Bursts. *Peter D. Usher, Ke-Liang Huang, Kenneth J. Mitchell, and Joseph T. Pollock*. **264**, 451, 7-C2 (1983)
- Spectroscopy of Variable Blue Stellar Objects. *Peter D. Usher, Archibald Warnock III, and Richard F. Green*. **269**, 73, 65-F12 (1983)
- USON, JUAN M. Effect of Variable Obscuration on the Clustering of Galaxies. *Michael Seldner and Juan M. Uson*. **264**, 1, 1-A6 (1983)
- UTSUMI, KENICHI. Enhancement of Thermonuclear Reaction Rate Due to Screening by Relativistic Degenerate Electrons. *Seisuo Ichimaru and Kenichi Utsumi*. **269**, L51, 76-B11 (1983)
- VAGNETTI, F. Quasar Evolution and Gravitational Collapse. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti*. **269**, 57, 65-E10 (1983)
- Quasar Evolution and Gravitational Collapse: Erratum. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti*. **273**, 837, 122-F6 (1983) (Orig. paper in **269**, 57, 65-E10)
- VAIANA, G. Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. *R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner*. **270**, 270, 79-G7 (1983)
- VAIANA, G. S. Coordinated Einstein and IUE Observations of a Disparitions Brusques Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana*. **267**, 280, 43-A1 (1983)
- Einstein Observations of X-Ray Emission from A Stars. *L. Golub, F. R. Harnden, Jr., C. W. Maxson, R. Rosner, G. S. Vaiana, Webster Cash, Jr., and Theodore P. Snow, Jr.* **271**, 264, 90-G11 (1983)
- VALDES, F. Alignment of Faint Galaxy Images: Cosmological Distortion and Rotation. *F. Valdes, J. A. Tyson, and J. F. Jarvis*. **271**, 431, 94-B5 (1983)
- VALDES, FRANCISCO. Spiral Gravitational Potentials and the Mass Growth of Molecular Clouds. *John Kwan and Francisco Valdes*. **271**, 604, 96-B5 (1983)
- VALLÉE, J. P. Magnetic Field Structure in the Gum Nebula Area. *J. P. Vallée and R. C. Bignell*. **272**, 131, 102-D12 (1983)
- Linear Polarization Observations in Selected Celestial Zones: The Gum Nebula Area. *R. C. Bignell and J. P. Vallée*. **53**, 147, 18-D9 (1983) (Abstr. in **271**, 893, 99-C1)
- VANBEVEREN, D. The Evolution of Massive Stars: The Numbers and Distribution of O Stars and Wolf-Rayet Stars. *Peter S. Conti, Catharine D. Garmany, C. de Loore, and D. Vanbeveren*. **274**, 302, 127-B3 (1983)
- VAN BREUGEL, W. An Infrared and Optical Investigation of Galactic Nuclei with Compact Radio Sources. *T. M. Heckman, M. J. Lebofsky, G. H. Rieke, and W. van Breugel*. **272**, 400, 106-B8 (1983)
- VAN BREUGEL, WIL. Radio and Optical Observations of the Alleged Optical Jet in DA 240. *Wil van Breugel, Timothy Heckman, Alan Bridle, Harvey Butcher, Richard Strom, and Bruce*



- Balick. 275, 61, 137-E11 (1983)
- VAN BUREN, DAVE. Detection of Flarelike Events and Their Relationship to Presumed Spot Regions of V471 Tauri: A Solar-Stellar Connection. *Arthur Young, A. Klimke, John L. Africano, Rob Quigley, Richard R. Radick, and Dave Van Buren*. 267, 655, 48-A3 (1983)
- VANDENBERG, DON A. Studies of Late-Type Dwarfs. V. Theoretical Models for Lower Main-Sequence Stars. *Don A. Vandenberg, F. D. A. Hartwick, P. Dawson, and David R. Alexander*. 266, 747, 36-D12 (1983)
- Star Clusters and Stellar Evolution. I. Improved Synthetic Color-Magnitude Diagrams for the Oldest Clusters. *Don A. Vandenberg*. 51, 29, 1-D1 (1983) (Abstr. in 263, 1006, 142-F7)
- VAN DEN BERGH, SIDNEY. The Nature of the Cluster Surrounding 3C 295. *Sidney van den Bergh*. 265, 606, 19-B14 (1983)
- The Supernova near the Nuclei of M31 and the Galaxy. *Sidney van den Bergh*. 265, 719, 20-E9 (1983)
- Optical Studies of Cassiopeia A. VI. Observations during the Period 1976-1980. *Sidney van den Bergh and Karl W. Kamper*. 268, 129, 53-C9 (1983)
- A Search for OB Associations near Southern Long-Period Cepheids. II. CT Carinae, UU Muscae, VZ Puppis, SV Velorum, and EZ Velorum. *Sidney van den Bergh, P. Frank Younger, Elmar B. F. Brosterhus, and Gonzalo Alcaino*. 53, 765, 27-B1 (1983) (Abstr. in 274, 921, 135-E2)
- VANDEN BOUT, PAUL A. Cyanoacetylene as a Density Probe of Molecular Clouds. *Paul A. Vandenberg, Robert B. Loren, Ronald L. Snell, and Alwyn Wootten*. 271, 161, 89-F7 (1983)
- VAN DEN HORN, L. J. Bulk Viscosity of Degenerate Neutrinos. *Ch. G. van Weert and L. J. van den Horn*. 270, 315, 80-C12 (1983)
- VAN DER HULST, J. M. The H I Absorption in NGC 5128 (Centaurus A). *J. M. van der Hulst, W. F. Golisch, and A. D. Haschick*. 264, L37, 11-A9 (1983)
- Radio Continuum Observations of the Bar of NGC 1097. *Marc P. Ondrechen and J. M. van der Hulst*. 269, L47, 76-B7 (1983)
- VANDERVOORT, PETER O. On the Oscillations and the Stability of Stellar Systems. *Peter O. Vandervoort*. 273, 511, 119-B9 (1983)
- VAN DISHOECK, EWINE F. Interstellar C<sub>2</sub> Molecules in a Taurus Dark Cloud. *L. M. Hobbs, John H. Black, and Ewine F. van Dishoeck*. 271, L95, 100-D7 (1983)
- VAN FLANDERN, THOMAS C. On the Clock Mechanism and the Implausibility of the 35 Day Precessing Disk in HZ Herculis/Hercules X-1. *Yoji Kondo, Thomas C. Van Flandern, and Charles L. Wolff*. 273, 716, 121-D8 (1983)
- VAN GORKOM, J. H. H I Observations of the High-Velocity System in NGC 1275. *J. H. van Gorkom and R. D. Ekers*. 267, 528, 46-E12 (1983)
- Anomalous Radio Continuum Features in Edge-on Spiral Galaxies. *E. Hummel, J. H. van Gorkom, and C. G. Kotanyi*. 267, L5, 45-B6 (1983)
- Einstein Observations of NGC 4438: Dynamical Ablation of Gas in the Virgo Cluster. *C. Kotanyi, J. H. van Gorkom, and R. D. Ekers*. 273, L7, 117-B7 (1983)
- A Survey of H I Absorption at Low Latitudes. *John M. Dickey, Shrinivas R. Kulkarni, J. H. van Gorkom, and Carl E. Heiles*. 53, 591, 24-G11 (1983) (Abstr. in 273, 840, 122-F10)
- VAN HORN, H. M. Nonradial g-Mode Oscillations of Warm Neutron Stars. *P. N. McDermott, H. M. Van Horn, and J. F. Scholl*. 268, 837, 62-C5 (1983)
- The Pulsation Properties of DB White Dwarfs: A Preliminary Analysis. *D. E. Winget, H. M. Van Horn, M. Tassoul, C. J. Hansen, and G. Fontaine*. 268, L33, 57-C10 (1983)
- VAN HOVEN, G. Energy Dynamics in Stressed Magnetic Fields: The Filamentation and Flare Instabilities. *G. Van Hoven, R. S. Steinolfson, and T. Tachi*. 268, 860, 62-D14 (1983)
- VAN PARADIJS, J. see also LAWRENCE, A., et al
- VAN PARADIJS, J. Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. *A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsuoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs*. 271, 793, 98-B8 (1983)
- VAN SPEYBROECK, L. The X-Ray Morphology of Abell 1367. *J. Bechtold, W. Forman, R. Giacconi, C. Jones, J. Schwarz, W. Tucker, and L. Van Speybroeck*. 265, 26, 12-C7 (1983)
- VAN STEENBERG, MICHAEL. Observationally Determined Fe II Oscillator Strengths. *J. Michael Shull, Michael Van Steenberg, and C. Gregory Seab*. 271, 408, 92-D4 (1983)
- VAN WEERT, CH. G. Bulk Viscosity of Degenerate Neutrinos. *Ch. G. van Weert and L. J. van den Horn*. 270, 315, 80-C12 (1983)
- VARMA, RAM K. On the Global Density Waves in Self-gravitating Flat Disks. *Ashok Ambastha and Ram K. Varma*. 264, 413, 6-G2 (1983)
- VARVOGLIS, H. Selective Nonresonant Acceleration of <sup>3</sup>He<sup>++</sup> and Heavy Ions by H<sup>+</sup> Cyclotron Waves. *H. Varvoglis and K. Papadopoulos*. 270, L95, 87-F3 (1983)
- VAUCLAIR, GÉRARD. Chemical Separation in Horizontal-Branch Stars. *Georges Michaud, Gérard Vauclair, and Sylvie Vauclair*. 267, 256, 42-F4 (1983)
- VAUCLAIR, SYLVIE. Chemical Separation in Horizontal-Branch Stars. *Georges Michaud, Gérard Vauclair, and Sylvie Vauclair*. 267, 256, 42-F4 (1983)
- VAUGHAN, ARTHUR H. Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Balunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning*. 275, 752, 145-F7 (1983)
- VEDDER, PETER W. Measurement of Coronal X-Ray Emission Lines from Capella. *Peter W. Vedder and Claude R. Canizares*. 270, 666, 85-D2 (1983)
- VENUGOPAL, V. R. see LAWRENCE, A., et al
- VERBUNT, F. A New Technique for Calculations of Binary Stellar Evolution, with Application to Magnetic Braking. *S. Rapaport, F. Verbunt, and P. C. Joss*. 275, 713, 145-C10 (1983)
- VERTER, F. Regions of Low Molecular Column Density Near the Galactic Plane. *F. Verner, G. R. Knapp, A. A. Stark, and R. W. Wilson*. 52, 289, 13-D8 (1983) (Abstr. in 269, 809, 75-C8)
- VESTRAND, W. THOMAS. Gamma-Rays and the Production of Energetic Electrons in Enshrouding Material: A Model for the Quiescent Radio Emission from Cygnus X-3. *W. Thomas Vestrand*. 271, 304, 91-C9 (1983)
- VIALLEFOND, F. A Multifrequency Study of Star Formation in the Blue Compact Dwarf Galaxy I Zw 36. *F. Viallefond and Trinh X. Thuan*. 269, 444, 71-C11 (1983)
- VIETRI, M. Analysis of Box Orbits in a Triaxial Galaxy. *M. Vietri and M. Schwarzschild*. 269, 487, 71-F13 (1983)
- VIETRI, MARIO. The Statistics of Gravitational Lenses: Apparent Changes in the Luminosity Function of Distant Sources Due to Passage of Light through a Single Galaxy. *Mario Vietri and Jeremiah P. Ostriker*. 267, 488, 46-B14 (1983)
- VILLUMSEN, JENS VERNER. The Vertical Growth and Structure of Galactic Disks. *Jens Verner Villumsen*. 274, 632, 132-C11 (1983)
- VISHNIAC, ETHAN T. The Dynamic and Gravitational Instabilities of Spherical Shocks. *Ethan T. Vishniac*. 274, 152, 125-E4 (1983)
- VISVANATHAN, N. A Global Value of the Hubble Constant. *N. Visvanathan*. 275, 430, 142-C2 (1983)
- Linear Polarization Measurements of the AM Herculis Objects H0139-68 and E1405-451. *N. Visvanathan and I. Tuohy*. 275, 709, 145-C6 (1983)
- VIVEKANAND, M. A New Model for the Emission Geometry in PSR 0950+08. *Ramesh Narayan and M. Vivekanand*. 274,

- 771, 133-F14 (1983)
- VLAHOS, LOUKAS. Electron Cyclotron Wave Acceleration Outside a Flaring Loop. *Phillip Sprangle and Loukas Vlahos*. **273**, L95, 123-D3 (1983)
- Stochastic Three-Wave Interaction in Flaring Solar Loops. *Loukas Vlahos, R. R. Sharma, and K. Papadopoulos*. **275**, 374, 141-A12 (1983)
- VOGEL, S. N. Source of the High-Velocity Molecular Flow in Orion. *M. C. H. Wright, R. L. Plambeck, S. N. Vogel, P. T. P. Ho, and W. J. Welch*. **267**, L41, 45-E3 (1983)
- A Rotating Protocluster in W50: HCO<sup>+</sup> Aperture Synthesis Maps. *S. N. Vogel and W. J. Welch*. **269**, 568, 72-F1 (1983)
- VOGEL, STUART N. Formation of OB Clusters: OH Maser Observations. *Paul T. P. Ho, Aubrey D. Haschick, Stuart N. Vogel, and Melvyn C. H. Wright*. **265**, 295, 15-C14 (1983)
- VOGT, STEVEN S. Rotational Studies of Late-Type Stars. III. Rotation among BY Draconis Stars. *Steven S. Vogt, David R. Soderblom, and G. Donald Penrod*. **269**, 250, 67-G11 (1983)
- Detection of High-Order Nonradial Oscillations on the Rapid Rotator Zeta Ophiuchi and Their Line with Be Type Outbursts. *Steven S. Vogt and G. Donald Penrod*. **275**, 661, 144-F14 (1983)
- VOIGT, G.-H. The Magnetosphere of Uranus: Plasma Sources, Convection, and Field Configuration. *G.-H. Voigt, T. W. Hill, and A. J. Dessler*. **266**, 390, 31-B8 (1983)
- VON ROSENVEINGE, T. T. First-Order Fermi Acceleration in Solar Flares as a Mechanism for the Second-Step Acceleration of Prompt Protons and Relativistic Electrons. *T. Bai, H. S. Hudson, R. M. Pelling, R. P. Lin, R. A. Schwartz, and T. von Rosenvinge*. **267**, 433, 44-E3 (1983)
- VRBA, F. J. Periodic Light Variations in Four Pre-Main-Sequence K Stars. *A. E. Rydgren and F. J. Vrba*. **267**, 191, 42-A8 (1983)
- WAAK, JOHN A. High-Density Gas Associated with "Molecular Jets": NGC 1333 and NGC 2071. *P. R. Schwartz, John A. Waak, and Howard A. Smith*. **267**, L109, 51-C12 (1983)
- WADDINGTON, C. J. The Propagation of Ultraheavy Cosmic Ray Nuclei. *N. R. Brewster, P. S. Freier, and C. J. Waddington*. **264**, 324, 4-D3 (1983)
- Cosmic-Ray Abundances of Sn, Te, Xe, and Ba Nuclei Measured on HEAO 3. *W. R. Binns, R. K. Fickle, T. L. Garrard, M. H. Israel, J. Klarmann, K. E. Krombel, E. C. Stone, and C. J. Waddington*. **267**, L93, 51-B12 (1983)
- WADE, C. M. An Upper Limit to the Microwave Continuum Radiation from Comet Austin (1982g). *L. E. Snyder, Patrick Palmer, and C. M. Wade*. **269**, L21, 69-B6 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Limits to the Rate of Component Separation in Scorpius X-1. *E. B. Fomalont, B. J. Geldzahler, R. M. Hjellming, and C. M. Wade*. **275**, 802, 146-C11 (1983)
- WADEHRA, J. M. Scaling Laws for Hydrogen-like Atoms in Magnetic Fields of Arbitrary Strength. *J. M. Wadehra*. **271**, 879, 99-B1 (1983)
- WADIAK, E. JAMES. Radio Recombination Lines from Quasars. I. Level Populations of Hydrogenic Ions in a Strong, Nonthermal Radiation Field. *E. James Wadiak, Craig L. Sarazin, and Robert L. Brown*. **53**, 351, 21-E3 (1983) (Abstr. in **272**, 785, 110-C10)
- WAGNER, W. The Association of Radio Noise Storm Enhancements with the Appearance of Additional Material in the Corona. *A. Kerdron, M. Pick, G. Trotter, C. Sawyer, R. Illing, W. Wagner, and L. House*. **265**, L19, 18-F1 (1983)
- WAKAMATSU, KEN-ICHI. MCG 5-29-86: A Galaxy with a Prolate Central Bulge? *Ken-ichi Wakamatsu and Halton C. Arp*. **273**, 167, 114-A8 (1983)
- WALBORN, NOLAN R. Metal-deficient O9-B0 Supergiants in the Small Magellanic Cloud. *Nolan R. Walborn*. **265**, 716, 20-E6 (1983)
- A Comment on "A Comparative Study of Rotational Properties of High-Velocity and Low-Velocity Early-Type Stars". *Nolan R. Walborn*. **267**, L59, 45-F4 (1983)
- A Survey of Spectral Morphology and Rotational Velocities among the Helium-rich Stars. *Nolan R. Walborn*. **268**, 195, 54-B3 (1983)
- WALKER, E. N. Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. *J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radoslitz, W. C. Priedhorsky, J. Terrell, and E. N. Walker*. **271**, L65, 100-B8 (1983)
- WALKER, MERLE F. Studies of Extremely Young Clusters. VII. Spectroscopic Observations of Faint Stars in the Orion Nebula. *Merle F. Walker*. **271**, 642, 96-E2 (1983)
- Rapid Rotation among Pleiades K Dwarfs. *David R. Soderblom, Burton F. Jones, and Merle F. Walker*. **274**, L37, 129-C12 (1983)
- WALKER, R. C. Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. *A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney*. **265**, 107, 13-C2 (1983)
- Rectilinear Motions in 3C 345. *M. H. Cohen, S. C. Unwin, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **269**, L1, 69-A3 (1983)
- Superluminal Motion in the Quasar 3C 345. *S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **271**, 536, 95-C13 (1983)
- WALLACE, R. K. The Thermonuclear Model for X-Ray Transients: Erratum. *R. K. Wallace, S. E. Woosley, and Thomas A. Weaver*. **264**, 746, 10-D10 (1983) (Orig. paper in **258**, 696, 81-A1)
- WALLERSTEIN, GEORGE. Quantitative Technetium and Niobium Abundances in Heavy-Element Stars. *Verne V. Smith and George Wallerstein*. **273**, 742, 121-F6 (1983)
- The Chemical Composition of Stars in Globular Clusters. *Catherine A. Pilachowski, Christopher Sneden, and George Wallerstein*. **52**, 241, 12-G9 (1983) (Abstr. in **269**, 810, 75-C9)
- WALTER, F. M. On the Coronae of Rapidly Rotating Stars. IV. Coronal Activity in F Dwarfs and Implications for the Onset of the Dynamo. *F. M. Walter*. **274**, 794, 134-A12 (1983)
- HEAO A-2 Soft X-Ray Source Catalog. *J. J. Nugent, K. A. Jensen, J. A. Nousek, G. P. Garmire, K. O. Mason, F. M. Walter, C. S. Bowyer, R. A. Stern, and G. R. Riegler*. **51**, 1, 1-A2 (1983) (Abstr. in **263**, 1007, 142-F8)
- WALTER, FREDERICK M. First Observations of Stellar Coronal Structure: The Coronae of AR Lacertae. *Frederick M. Walter, David M. Gibson, and Gabor S. Basri*. **267**, 665, 48-A13 (1983)
- Observations of Suspected Low-Mass Post-T Tauri Stars and Their Evolutionary Status. *Reinhard Mundt, Frederick M. Walter, Eric D. Feigelson, Ulrich Finkenzeller, George H. Herbig, and Andrew P. Odell*. **269**, 229, 67-F3 (1983)
- WANG, D. SiO Isotopic Maser Emission from VY Canis Majoris. *S. Deguchi, J. Good, Y. Fan, X. Mao, D. Wang, and Nobuharu Ukita*. **264**, L65, 11-C8 (1983)
- WANG, JIA-LONG. High-Resolution Photography of the Solar Chromosphere. XVII. Geometry of Ha Flare Loops Observed on the Disk. *R. E. Loughhead, Jia-Long Wang, and G. Blows*. **274**, 883, 135-A9 (1983)
- WANNIER, P. G. Interferometric Observations of Solar Limb Structure at 2.6 Millimeters. *P. G. Wannier, G. J. Hurford,*

- and G. A. Seielstad. **264**, 660, 9-D14 (1983)
- The Polarization of Millimeter-Wave Emission Lines in Dense Interstellar Clouds. P. G. Wannier, N. Z. Scoville, and R. Barvainis. **267**, 126, 41-C11 (1983)
- WANNIER, PETER G. Warm H I Halos around Molecular Clouds. Peter G. Wannier, Stephen M. Lichten, and Mark Morris. **268**, 727, 61-B5 (1983)
- WARD, MARTIN. The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin. **269**, 375, 70-E2 (1983)
- WARDLE, J. F. C. X-Ray Studies of Quasars with the Einstein Observatory. III. The 3CR Sample. H. Tananbaum, J. F. C. Wardle, G. Zamorani, and Y. Avni. **268**, 60, 52-E9 (1983)
- WARNOCK, A., III. The Albedo of Uranus. G. W. Lockwood, B. L. Lutz, D. T. Thompson, and A. Warnock III. **266**, 402, 31-C6 (1983)
- WARNOCK, ARCHIBALD, III. Spectroscopy of Variable Blue Stellar Objects. Peter D. Usher, Archibald Warnock III, and Richard F. Green. **269**, 73, 65-F12 (1983)
- WASILEWSKI, A. J. The QSO 1156+295: A Multifrequency Study of Recent Activity. Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- WASILEWSKI, ANTHONY J. The Space Density and Spectroscopic Properties of a New Sample of Emission-Line Galaxies. Anthony J. Wasilewski. **272**, 68, 101-F13 (1983)
- WASSERMAN, I. Spherical Simulations of Holes and Honeycombs in Friedmann Universes. G. L. Hoffman, E. E. Salpeter, and I. Wasserman. **268**, 527, 58-F13 (1983)
- WASSERMAN, IRA. Masses, Radii, and Magnetic Fields of Pulsating X-Ray Sources: Is the "Standard" Model Self-consistent? Ira Wasserman and Stuart L. Shapiro. **265**, 1036, 24-B2 (1983)
- Equilibrium Composition and Neutrino Emissivity of Interacting Quark Matter in Neutron Stars. Robert C. Duncan, Stuart L. Shapiro, and Ira Wasserman. **267**, 358, 43-F12 (1983)
- Implications of the Millisecond Pulsar for Neutron Star Models. Stuart L. Shapiro, Saul A. Teukolsky, and Ira Wasserman. **272**, 702, 109-D10 (1983)
- WATANABE, M. Diameter versus Surface Brightness Diagram of Galaxies. K. Kodaira, S. Okamura, and M. Watanabe. **274**, L49, 136-A4 (1983)
- WATSON, DAN M. Detection of Interstellar NH<sub>3</sub> in the Far-Infrared: Warm and Dense Gas in Orion-KL. C. H. Townes, R. Genzel, Dan M. Watson, and J. W. V. Storey. **269**, L11, 69-A12 (1983)
- A Far-Infrared Study of the N/O Abundance Ratio in Galactic H II Regions. Daniel F. Lester, Harriet L. Dinerstein, Michael W. Werner, Dan M. Watson, and Reinhard L. Genzel. **271**, 618, 96-C6 (1983)
- WATSON, M. G. Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. M. Garcia, S. L. Baliunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson. **267**, 291, 43-A13 (1983)
- The X-Ray Lobes of SS 433. M. G. Watson, R. Willingale, J. E. Grindlay, and F. D. Seward. **273**, 688, 121-B6 (1983)
- WATSON, W. D. Further Analysis of the Possible Effects of Iso-
- tope-selective Photodissociation on Interstellar Carbon Monoxide. Y.-H. Chu and W. D. Watson. **267**, 151, 41-E8 (1983)
- Transfer of Polarized Radiation in Astronomical Masers. L. R. Western and W. D. Watson. **268**, 849, 62-D3 (1983)
- Geometrical Effects on the Emission Properties of Astronomical Masers: Linear Polarization and Apparent Size. L. R. Western and W. D. Watson. **274**, 195, 126-A5 (1983)
- A Multilevel Model for Astronomical SiO Masers. M. Elitzur, W. D. Watson, and L. R. Western. **274**, 210, 126-B6 (1983)
- Linear Polarization of Astronomical Masers by Anisotropic Pumping and Its Enhancement Due to Geometry. L. R. Western and W. D. Watson. **275**, 195, 139-B11 (1983)
- WEAVER, H. A. Rocket Detection of Ultraviolet Emission from Neutral Oxygen and Sulfur in the Io Torus. S. T. Durrance, P. D. Feldman, and H. A. Weaver. **267**, L125, 51-D14 (1983)
- WEAVER, THOMAS A. The Thermonuclear Model for X-Ray Transients: Erratum. R. K. Wallace, S. E. Woosley, and Thomas A. Weaver. **264**, 746, 10-D10 (1983) (Orig. paper in **258**, 696, 81-A1)
- WEBB, G. M. First Order and Second Order Fermi Acceleration of Energetic Charged Particles by Shock Waves. G. M. Webb. **270**, 319, 80-D2 (1983)
- On the Drift Mechanism for Energetic Charged Particles at Shocks. G. M. Webb, W. I. Axford, and T. Terasawa. **270**, 537, 84-A10 (1983)
- WEBB, J. R. The QSO 1156+295: A Multifrequency Study of Recent Activity. Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea. **274**, 101, 125-A9 (1983)
- WEBBER, W. R. A Measurement of the Energy Spectra and Relative Abundance of the Cosmic-Ray H and He Isotopes over a Broad Energy Range. W. R. Webber and S. M. Yushak. **275**, 391, 141-C1 (1983)
- WEBBINK, R. F. On the Evolutionary Status of Bright, Low-Mass X-Ray Sources. R. F. Webbink, S. Rappaport, and G. J. Savonije. **270**, 678, 85-E1 (1983)
- WEEDMAN, D. W. Star Bursts and the Extraordinary Galaxy NGC 3690. R. D. Gehrz, R. A. Sramek, and D. W. Weedman. **267**, 551, 46-G7 (1983)
- WEEDMAN, DANIEL W. Toward Explaining Seyfert Galaxies. Daniel W. Weedman. **266**, 479, 33-E5 (1983)
- WEGNER, G. Observations of Ultraviolet Carbon Lines in the Spectra of Three DC White Dwarfs. G. Wegner. **268**, 282, 55-A9 (1983)
- Element Identifications in the Ultraviolet Spectrum of HD 101065. G. Wegner, D. J. Cummins, P. B. Byrne, and D. J. Stickland. **272**, 646, 108-G5 (1983)
- WEGNER, GARY. The Cool DC White Dwarf Stein 2051B. Gary Wegner and F. H. Yackovich. **275**, 240, 139-F3 (1983)
- WEGNER, GARY A. A Proposed New White Dwarf Spectral Classification System. Edward M. Sion, Jesse L. Greenstein, John D. Landstreet, James Liebert, Harry L. Shipman, and Gary A. Wegner. **269**, 253, 68-A1 (1983)
- WEHINGER, P. Optical and Radio Structure of the Quasar PKS 0812+02. S. Wyckoff, K. Johnston, F. Ghigo, L. Rudnick,

- P. Wehinger, and A. Boksenberg. **265**, 43, 12-E4 (1983)
- WEHRLE, ANN E. VLBI Observations of the Nucleus of Centaurus A. Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson. **266**, L93, 39-B8 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson. **268**, L23, 57-B13 (1983)
- WEILER, K. W. The Arc Second Radio Structure of 12 BL Lacertae Objects. J. S. Ulvestad, K. J. Johnston, and K. W. Weiler. **266**, 18, 27-B9 (1983)
- WEILER, KURT W. A Catalog of High Accuracy Circular Polarization Measurements. Kurt W. Weiler and Imke de Pater. **52**, 293, 13-D12 (1983) (Abstr. in **269**, 808, 75-C7)
- WEINBERG, MARTIN D. The Riemann Disks. I. Equilibrium and Secular Evolution. Martin D. Weinberg and Scott Tremaine. **271**, 586, 96-A1 (1983)
- The Riemann Disks. II. Stability. Martin D. Weinberg. **271**, 595, 96-A10 (1983)
- WEINBERGER, R. A Newly Discovered Nearby Planetary Nebula of Old Age. R. Weinberger, J. Dengel, H. Harlil, and F. Sabbadin. **265**, 249, 14-G9 (1983)
- WEIS, E. W. A Catalog of Spectral Classification and Photometry of Barium Stars. P. K. Lü, D. W. Dawson, A. R. Upgren, and E. W. Weis. **52**, 169, 11-E11 (1983) (Abstr. in **268**, 905, 63-A8)
- WEISBERG, J. M. An Attempt to Resolve Pulsar Magnetospheres Using Interstellar Scintillations. J. M. Cordes, J. M. Weisberg, and V. Boriakoff. **268**, 370, 56-A1 (1983)
- WEISS, ITZHAK. Theoretical Non-Maxwellian Particle Velocity Distribution Functions for Spherically Symmetric Solar Wind-like Plasma Systems and Consequences. Sami Cuperman, Itzhak Weiss, and Murray Dryer. **273**, 363, 116-B14 (1983)
- WEISS, R. A Search for the Sunyaev-Zel'dovich Effect at Millimeter Wavelengths. S. S. Meyer, A. D. Jeffries, and R. Weiss. **271**, L1, 93-A2 (1983)
- WEISSKOPF, M. C. On Searches for Pulsed Emission with Application to Four Globular Cluster X-Ray Sources: NGC 1851, 6441, 6624, and 6712. D. A. Leahy, W. Darbro, R. F. Elsner, M. C. Weisskopf, P. G. Sutherland, S. Kahn, and J. E. Grindlay. **266**, 160, 28-F9 (1983)
- X-Ray Observations of 4U 1626-67 by the Monitor Counter on the Einstein (HEAO 2) Observatory. R. F. Elsner, W. Darbro, D. Leahy, M. C. Weisskopf, P. G. Sutherland, S. M. Kahn, and J. E. Grindlay. **266**, 769, 36-F6 (1983)
- The Period History of the X-Ray Pulsar in MSH 15-52. M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Narayan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward. **267**, 711, 48-E5 (1983)
- On Searches for Periodic Pulsed Emission: The Rayleigh Test Compared to Epoch Folding. D. A. Leahy, R. F. Elsner, and M. C. Weisskopf. **272**, 256, 103-F14 (1983)
- X-Ray Observations of LMC X-3 with the Monitor Proportional Counter aboard the HEAO 2 Einstein Observatory: A Comparison with Cygnus X-1. M. C. Weisskopf, S. M. Kahn, W. D. Darbro, R. F. Elsner, J. E. Grindlay, S. Narayan, P. G. Sutherland, and A. C. Williams. **274**, L65, 136-B7 (1983)
- WEISTROP, DONNA. CCD Photometry of the BL Lacertae Object 1400+162 and the Associated Group of Galaxies. Donna Weistrop, David B. Shaffer, Harold J. Reitsema, and Bradford A. Smith. **271**, 471, 94-E11 (1983)
- WELCH, D. L. The Distance to NGC 6822 from Infrared Photometry of Cepheids. Christopher W. McAlary, Barry F. Madore, R. McGonegal, R. A. McLaren, and D. L. Welch. **273**, 539, 119-D12 (1983)
- WELCH, W. J. Source of the High-Velocity Molecular Flow in Orion. M. C. H. Wright, R. L. Plambeck, S. N. Vogel, P. T. P. Ho, and W. J. Welch. **267**, L41, 45-E3 (1983)
- A Rotating Protocluster in W58: HCO<sup>+</sup> Aperture Synthesis Maps. S. N. Vogel and W. J. Welch. **269**, 568, 72-F1 (1983)
- WELLER, C. S. SOLRAD 11 Observations of the Far-Ultraviolet Background. C. S. Weller. **268**, 899, 63-A1 (1983)
- WELLS, DONALD C. A Multiwavelength Comparison of Cassiopeia A and Tycho's Supernova Remnant: Erratum. John R. Dickel, Stephen S. Murray, Jeffrey Morris, and Donald C. Wells. **264**, 746, 10-D10 (1983) (Orig. paper in **257**, 145, 62-E6)
- The Evolution of Galaxies in Clusters. III. Photometry of 17 Intermediate Redshift Clusters. Harvey Butcher, Augustus Oemler, and Donald C. Wells. **52**, 183, 12-A2 (1983) (Abstr. in **269**, 809, 75-C8)
- WENTZEL, DONAT G. Solar Radio Emission Very near the Plasma Frequency. Donat G. Wentzel. **270**, 250, 79-F1 (1983)
- WERNER, M. W. Submillimeter Extensions of the Solar Limb Determined from Observations of the Total Eclipse of 1982 July 31. C. Lindsey, E. E. Becklin, J. T. Jefferies, F. Q. Orrall, M. W. Werner, and Ian Gatley. **264**, L25, 5-B9 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek. **268**, 68, 52-F3 (1983)
- Extended Near-Infrared Emission from Visual Reflection Nebulae. K. Sellgren, M. W. Werner, and Harriet L. Dinerstein. **271**, L13, 93-A13 (1983)
- The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams. **274**, 168, 125-F6 (1983)
- WERNER, MICHAEL W. The Polarization of the Infrared Cluster in Orion: The Spatial Distribution of the 3.8 Micron Polarization. Michael W. Werner, Harriet L. Dinerstein, and R. W. Capps. **265**, L13, 18-E10 (1983)
- A Far-Infrared Study of the N/O Abundance Ratio in Galactic H II Regions. Daniel F. Lester, Harriet L. Dinerstein, Michael W. Werner, Dan M. Watson, and Reinhard L. Genzel. **271**, 618, 96-C6 (1983)
- WESEMAEL, F. G74-7: A True DA,F (DAZ) White Dwarf. P. Lacombe, James Liebert, F. Wesemael, and G. Fontaine. **272**, 660, 109-A8 (1983)
- WESSON, PAUL S. A Note on the Formation of Clusters of Galaxies. Paul S. Wesson. **268**, 561, 59-B11 (1983)
- WESTERLUND, BENGT E. Carbon Stars in Local Group Galaxies. Harvey B. Richer and Bengt E. Westerlund. **264**, 114, 2-B10 (1983)
- WESTERN, L. R. Transfer of Polarized Radiation in Astronomical Masers. L. R. Western and W. D. Watson. **268**, 849, 62-D3 (1983)
- Geometrical Effects on the Emission Properties of Astronomical Masers: Linear Polarization and Apparent Size. L. R. Western and W. D. Watson. **274**, 195, 126-A5 (1983)
- A Multilevel Model for Astronomical SiO Masers. M. Elitzur, W. D. Watson, and L. R. Western. **274**, 210, 126-B6 (1983)
- Linear Polarization of Astronomical Masers by Anisotropic Pumping and Its Enhancement Due to Geometry. L. R. Western and W. D. Watson. **275**, 195, 139-B11 (1983)
- WEYMANN, RAY J. High-Resolution Spectroscopy of Selected Absorption Lines toward Quasi-stellar Objects. I. Lyman-Alpha toward PHL 957. Frederic H. Chaffee, Jr., Ray J. Weymann, David W. Latham, and Peter A. Strittmatter. **267**, 12, 40-B3 (1983)
- Common Lyman-Alpha Absorption Lines in the Triple QSO PG 1115+08. Ray J. Weymann and Craig B. Foltz. **272**, L1, 105-D2 (1983)



- WHALING, W. A Redetermination of the Solar Abundance of Molybdenum. *E. Biémont, N. Grevesse, P. Hannaford, R. M. Lowe, and W. Whaling*. **275**, 889, 147-C4 (1983)
- WHEATON, W. A. The State of Cygnus X-1. *J. C. Ling, W. A. Mahoney, W. A. Wheaton, A. S. Jacobson, and L. Kaluzienski*. **275**, 307, 140-D1 (1983)
- WHEELER, J. C. The Type I Supernova 1981b in NGC 4536: The First 100 Days. *David Branch, C. H. Lacy, Marshall L. McCall, P. G. Sutherland, A. Uomoto, J. C. Wheeler, and B. J. Wills*. **270**, 123, 78-C9 (1983)
- WHEELER, J. CRAIG. Pulsational Constraints on the Mass and Luminosity of R Coronae Borealis Stars. *Hideyuki Saio and J. Craig Wheeler*. **272**, L25, 105-F3 (1983)
- WHITAKER, RODNEY W. Star Formation within OB Subgroups: Implosion by Multiple Sources. *Richard I. Klein, Maxwell T. Sandford II, and Rodney W. Whitaker*. **271**, L69, 100-B12 (1983)
- WHITCOMB, S. E. Submillimeter Observations of W3. *D. T. Jaffe, R. H. Hildebrand, Jocelyn Keene, and S. E. Whitcomb*. **273**, L89, 123-C11 (1983)
- WHITE, N. E. A Two-Component X-Ray Spectrum from SMC X-1. *F. E. Marshall, N. E. White, and R. H. Becker*. **266**, 814, 37-C4 (1983)
- X-Ray Properties of the Be/X-Ray System 2S 0114+650 = LSI + 65°010. *G. Koenigsberger, J. H. Swank, A. E. Szymkowiak, and N. E. White*. **268**, 782, 61-F4 (1983)
- An X-Ray Survey of Nine Algol Systems. *N. E. White and F. E. Marshall*. **268**, L117, 64-A9 (1983)
- The X-Ray Absorption Spectrum of 4U 1700-37 and Its Implications for the Stellar Wind of the Companion HD 153919. *N. E. White, T. R. Kallman, and J. H. Swank*. **269**, 264, 68-A13 (1983)
- Accretion Powered X-Ray Pulsars. *N. E. White, J. H. Swank, and S. S. Holt*. **270**, 711, 85-G7 (1983)
- WHITE, RAYMOND E., III. Winds in Elliptical Galaxies. *Raymond E. White III and Roger A. Chevalier*. **275**, 69, 137-F11 (1983)
- WHITE, RICHARD A. cD Galaxy Dynamics and An Aged Ridge (Jet) in 3C 338. *Jack O. Burns, Erik Schwendeman, and Richard A. White*. **271**, 575, 95-G2 (1983)
- WHITE, RICHARD L. The X-Ray Surface Brightness of Kepler's Supernova Remnant. *Richard L. White and Knox S. Long*. **264**, 196, 3-A10 (1983)
- The Discovery of a Hot Stellar Wind. *Richard L. White and Robert H. Becker*. **272**, L19, 105-E12 (1983)
- WHITE, SIMON D. Nonlinear Evolution of Large-Scale Structure in the Universe. *Carlos S. Frenk, Simon D. White, and Marc Davis*. **271**, 417, 94-A5 (1983)
- WHITE, SIMON D. M. Simulations of Sinking Satellites. *Simon D. M. White*. **274**, 53, 124-E2 (1983)
- Clustering in a Neutrino-dominated Universe. *Simon D. M. White, Carlos S. Frenk, and Marc Davis*. **274**, L1, 129-A2 (1983)
- WHITFORD, A. E. Metal Content of K Giants in the Nuclear Bulge of the Galaxy. *A. E. Whitford and R. M. Rich*. **274**, 723, 133-C8 (1983)
- WHITMIRE, DANIEL P. Conservative Mass Transfer in Close Binary Systems. I. Equations of Motion for Spin and Orbital Angular Momenta. *John J. Matese and Daniel P. Whitmire*. **266**, 776, 36-F13 (1983)
- WHITNEY, CHARLES A. Stellar Acoustics. I. Adiabatic Pulse Propagation and Modal Resonance in Polytropic Models of Bump Cepheids. *Charles A. Whitney*. **274**, 830, 134-D6 (1983)
- WHITTET, D. C. B. Abundances of Carbon-bearing Diatomic Molecules in Diffuse Interstellar Clouds. *R. L. Dickman, W. B. Somerville, D. C. B. Whittet, D. McNally, and J. C. Blades*. **53**, 55, 17-E2 (1983) (Abstr. in **271**, 891, 99-B13)
- WIEHL, H. J. Evidence for Inhomogeneous Thermal Sources of Two Similar Solar Spike Events of 1978 May 5 and December 4. *H. J. Wiehl and U. Desai*. **270**, 256, 79-F7 (1983)
- WILTA, PAUL J. Beam Models for Radio Sources. IV. Improved Jet Collimation. *M. Javad Siah and Paul J. Wilta*. **270**, 427, 82-G1 (1983)
- WILKING, BRUCE A. The Discovery of New Embedded Sources in the Centrally Condensed Core of the Rho Ophiuchi Dark Cloud: The Formation of a Bound Cluster? *Bruce A. Wilking and Charles J. Lada*. **274**, 698, 133-A11 (1983)
- WILKINSON, P. N. VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young*. **272**, 383, 106-A5 (1983)
- WILL, CLIFFORD M. Tidal Gravitational Radiation from Homogeneous Stars. *Clifford M. Will*. **274**, 858, 134-F6 (1983)
- WILLIAMS, A. C. X-Ray Observations of LMC X-3 with the Monitor Proportional Counter aboard the HEAO 2 Einstein Observatory: A Comparison with Cygnus X-1. *M. C. Weisskopf, S. M. Kahn, W. D. Darbro, R. F. Elsner, J. E. Grindlay, S. Naranan, P. G. Sutherland, and A. C. Williams*. **274**, L65, 136-B7 (1983)
- WILLIAMS, B. A. The IC 698 Group of Galaxies. *B. A. Williams*. **271**, 461, 94-D7 (1983)
- WILLIAMS, G. The 1980 Outburst of 4U 0115+63 (V635 Casiopeiae). *G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen*. **266**, 806, 37-B10 (1983)
- WILLIAMS, GLEN. Spectroscopy of Cataclysmic Variables. I. Observations. *Glen Williams*. **53**, 523, 24-A2 (1983) (Abstr. in **273**, 839, 122-F9)
- WILLIAMS, P. M. The Unique Cometary Nebula Parsamian 13. *Martin Cohen, D. K. Aitkin, P. F. Roche, and P. M. Williams*. **273**, 624, 120-D2 (1983)
- WILLINGALE, R. The X-Ray Lobes of SS 433. *M. G. Watson, R. Willingale, J. E. Grindlay, and F. D. Seward*. **273**, 688, 121-B6 (1983)
- WILLIS, A. G. Discovery of a Quasar with a Wide Angle Radio Tail in a Distant Cluster of Galaxies. *D. E. Harris, P. E. Dewdney, C. H. Costain, H. Butcher, and A. G. Willis*. **270**, 39, 77-D4 (1983)
- WILLNER, S. P. Extinction to Ionized Gas at the Galactic Center. *S. P. Willner and Judith L. Pipher*. **265**, 760, 21-A13 (1983)
- The Strength of Paschen-Alpha in the Seyfert 1.9 Galaxy V Zwicky 317. *Richard J. Rudy and S. P. Willner*. **267**, L69, 51-A4 (1983)
- WILLS, B. J. The Type I Supernova 1981b in NGC 4536: The First 100 Days. *David Branch, C. H. Lacy, Marshall L. McCall, P. G. Sutherland, A. Uomoto, J. C. Wheeler, and B. J. Wills*. **270**, 123, 78-C9 (1983)
- WILLS, BEVERLEY J. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wiśniewski*. **274**, 62, 124-E11 (1983)
- Broad Emission Features in QSOs and Active Galactic Nuclei. I. New Calculations of Fe II Line Strengths. *Hagai Netzer and Beverley J. Wills*. **275**, 445, 142-D4 (1983)
- WILLS, D. The  $V/V_{\max}$  Test for QSOs: Comments on the Paper by Hawkins and Stewart. *D. Wills*. **270**, 48, 77-D13 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R.*

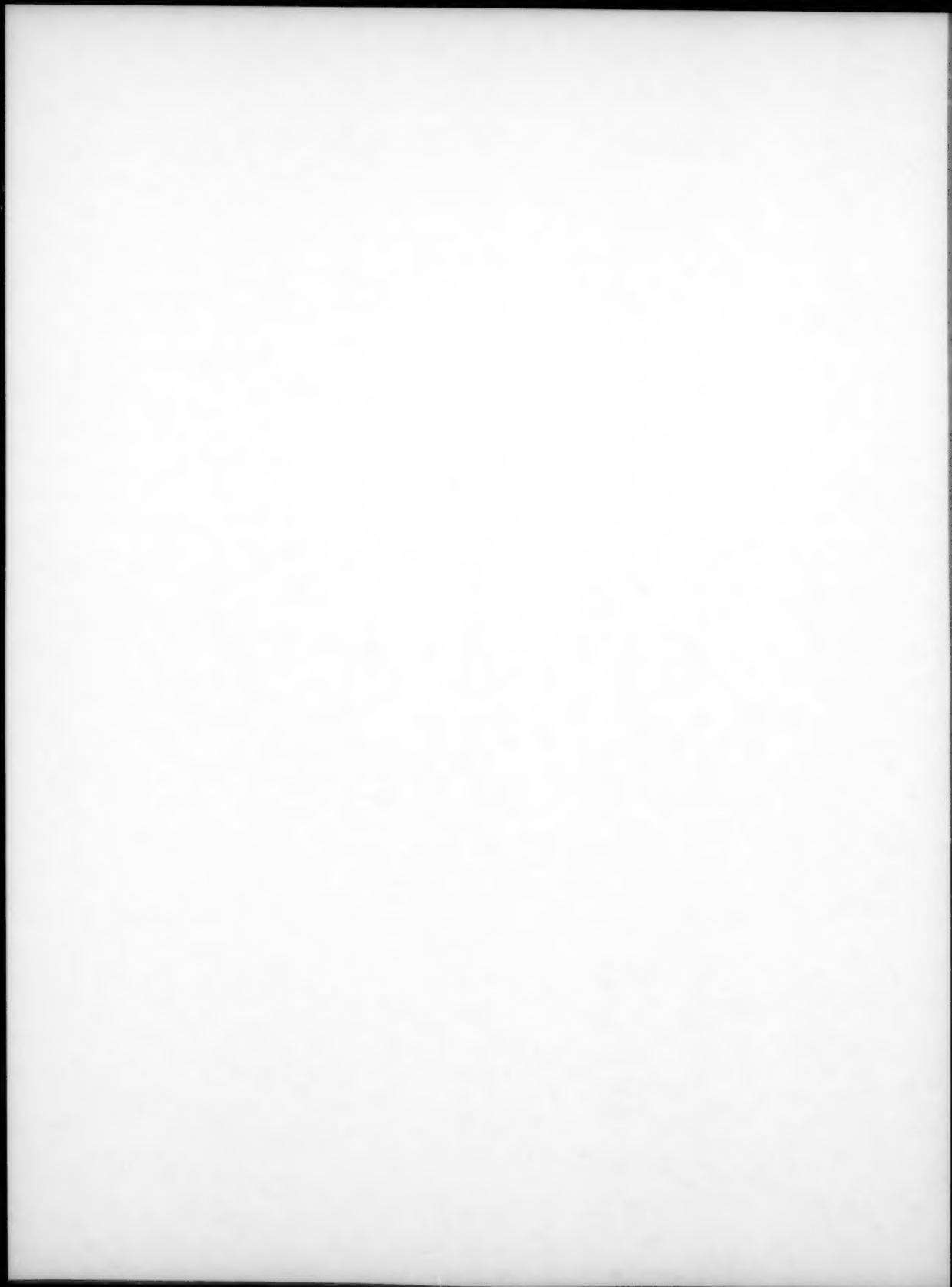
- Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wiśniewski. **274**, 62, 124-E11 (1983)
- WILLS, R. D. Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gottwald, W. Hermsen, G. Kanbach, H. A. Mayer-Haselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills.* **274**, 231, 126-C13 (1983)
- WILLSON, ROBERT F. Very Large Array Observations of Solar Active Regions. III. Multiple Wavelength Observations. *Kenneth R. Lang, Robert F. Willson, and Victor Galzanskas.* **267**, 455, 44-F12 (1983)
- WILSON, A. S. Radio Jets and High-Velocity Gas in the Seyfert Galaxy NGC 1068. *A. S. Wilson and J. S. Ulvestad.* **275**, 8, 137-A14 (1983)
- WILSON, ANDREW S. The Nuclear Radio Source of the X-Ray Galaxy NGC 2110. *James S. Ulvestad and Andrew S. Wilson.* **264**, L7, 5-A8 (1983)
- WILSON, C. K. Observations of a Hard X-Ray Component in the Spectrum of Nova Ophiuchi. *C. K. Wilson and R. E. Rothschild.* **274**, 717, 133-C2 (1983)
- WILSON, JAMES R. Bubbles, Jets, and Clouds in Active Galactic Nuclei. *Michael D. Smith, Larry Smarr, Michael L. Norman, and James R. Wilson.* **264**, 432, 7-A11 (1983)
- Planar Numerical Cosmology. I. The Differential Equations. *Joan Centrella and James R. Wilson.* **273**, 428, 118-B9 (1983)
- WILSON, M. L. On the Anisotropy of the Cosmological Background Matter and Radiation Distribution. II. The Radiation Anisotropy in Models with Negative Spatial Curvature. *M. L. Wilson.* **273**, 2, 112-A7 (1983)
- WILSON, P. R. Flux Changes in Small Magnetic Regions. *P. R. Wilson and G. W. Simon.* **273**, 805, 122-C14 (1983)
- WILSON, R. B. The Pulse Profile of the Crab Pulsar in the Energy Range 45 keV–1.2 MeV. *R. B. Wilson and G. J. Fishman.* **269**, 273, 68-B8 (1983)
- WILSON, R. W. Regions of Low Molecular Column Density Near the Galactic Plane. *F. Verter, G. R. Knapp, A. A. Stark, and R. W. Wilson.* **52**, 289, 13-D8 (1983) (Abstr. in **269**, 809, 75-C8)
- WILSON, T. L. The Distribution of 6 Centimeter H<sub>2</sub>CO in Orion Molecular Cloud I. *K. J. Johnston, Patrick Palmer, T. L. Wilson, and J. H. Bieging.* **271**, L89, 100-D2 (1983)
- WINDHORST, ROGER A. Einstein X-Ray Observations of Optical-Radio Selected Areas. *P. Katgerer, Trinh X. Thuan, and Roger A. Windhorst.* **275**, 1, 137-A6 (1983)
- WINGET, D. E. Pulsation Properties of DA White Dwarfs: Radial Mode Instabilities. *H. Saio, D. E. Winget, and E. L. Robinson.* **265**, 982, 23-E2 (1983)
- The Pulsation Properties of DB White Dwarfs: A Preliminary Analysis. *D. E. Winget, H. M. Van Horn, M. Tassoul, C. J. Hansen, and G. Fontaine.* **268**, L33, 57-C10 (1983)
- WINKLER, P. F. High-Velocity, Asymmetric Doppler Shifts of the X-Ray Emission Lines of Cassiopeia A. *T. H. Markert, C. R. Canizares, G. W. Clark, and P. F. Winkler.* **268**, 134, 53-D12 (1983)
- WINKLER, P. FRANK, JR. The Extraordinary Extragalactic Supernova Remnant in NGC 4449. II. X-Ray and Optical Investigations. *William P. Blair, Robert P. Kirshner, and P. Frank Winkler, Jr.* **272**, 84, 102-A3 (1983)
- WINTERS, R. R. <sup>187</sup>Os(*n, n'*) Inelastic Cross Section at 34 keV. *R. L. Macklin, R. R. Winters, N. W. Hill, and J. A. Harvey.* **274**, 408, 128-B11 (1983)
- WIRTH, A. NGC 1275: A Burgeoning Elliptical Galaxy. *A. Wirth, S. J. Kenyon, and D. A. Hunter.* **269**, 102, 66-A13 (1983)
- WIRTH, ALLAN. Galaxy Content of Selected Southern Groups: Elliptical Galaxies at Low Density. *Allan Wirth.* **274**, 541, 131-B3 (1983)
- WIŚNIEWSKI, W. Z. The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wiśniewski.* **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wiśniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea.* **274**, 101, 125-A9 (1983)
- WITHBROE, GEORGE L. The Role of Spicules in Heating the Solar Atmosphere: Implications of EUV Observations. *George L. Withbroe.* **267**, 825, 49-F14 (1983)
- WITT, ADOLF N. The Diffuse Interstellar Feature at 4430 Å and Interstellar Extinction in the Far-Ultraviolet. *Adolf N. Witt, Ralph C. Bohlin, and Theodore P. Stecher.* **267**, L47, 45-E8 (1983)
- On the Contributions of the Orion Reflection Nebulosity to the Continuous UV Spectrum of the Herbig-Haro Objects HH 1 and HH 2 and of the C-S Star. *Reinhard Mundt and Adolf N. Witt.* **270**, L59, 87-C6 (1983)
- WITTEBORN, F. C. The C<sub>2</sub>H, C<sub>3</sub>, and CN Electronic Absorption Bands in the Carbon Star HD 19557. *J. H. Goebel, J. D. Bregman, D. M. Cooper, D. Goorvitch, S. R. Langhoff, and F. C. Witteborn.* **270**, 190, 79-A7 (1983)
- Observations of NGC 7027 from 5.2 to 7.5 Microns: The Detection of Ni II and Additional Dust Features. *J. D. Bregman, H. L. Dinerstein, J. H. Goebel, D. F. Lester, F. C. Witteborn, and D. M. Rank.* **274**, 666, 132-F7 (1983)
- WITZEL, A. 3C 395—A Quasar with Asymmetrical Radio Structure. *K. J. Johnston, J. H. Spencer, A. Witzel, and E. B. Fomalont.* **265**, L43, 26-A11 (1983)
- WOLF, GEORGE W. A *uvby*,  $\beta$  Photometric Survey of Southern Hemisphere Eclipsing Binary Stars. *George W. Wolf and Janet T. Kern.* **52**, 429, 16-B7 (1983) (Abstr. in **270**, 780, 86-E7)
- WOLFE, A. M. Detection of 21 Centimeter Absorption at  $Z \approx 1.94$  in the QSO PKS 1157+014: Erratum. *A. M. Wolfe, F. H. Briggs, and D. L. Jauncey.* **267**, 891, 50-D13 (1983) (Orig. paper in **248**, 460, 86-F1)
- The Incidence of 21 Centimeter Absorption in QSO Redshift Systems Selected for Mg II Absorption: Evidence for a Two-Phase Nature of the Absorbing Gas. *F. H. Briggs and A. M. Wolfe.* **268**, 76, 52-F11 (1983)
- Why High-Latitude Clouds in Our Galaxy and the Highly Redshifted Clouds Observed in Front of QSOs Do Not Belong to the Same Parent Population. *A. M. Wolfe.* **268**, L1, 57-A3 (1983)
- Why High-Latitude Clouds in Our Galaxy and the Highly Redshifted Clouds Observed in Front of QSOs Do Not Belong to the Same Parent Population: Erratum. *A. M. Wolfe.* **271**, L43, 93-D3 (1983) (Orig. paper in **268**, L1, 57-A3)
- WOLFF, CHARLES L. The Rotational Spectrum of *g*-Modes in the Sun. *Charles L. Wolff.* **264**, 667, 9-E8 (1983)
- On the Clock Mechanism and the Implausibility of the 35 Day Precessing Disk in HZ Herculis/Hercules X-1. *Yoji Kondo, Thomas C. Van Flinders, and Charles L. Wolff.* **273**, 716, 121-D8 (1983)
- WOLFF, SIDNEY C. H $\alpha$  Line Profiles in B Stars: Comparison of Theory and Observations. *J. N. Heasley and Sidney C. Wolff.* **269**, 634, 73-C14 (1983)

- WOLFSON, C. J. X-Ray Line Ratios from Helium-like Ions: Updated Theory and SMM Flare Observations. *C. J. Wolfson, J. G. Doyle, J. W. Leibacher, and K. J. H. Phillips.* **269**, 319, 68-F2 (1983)
- WOOD, K. H0323+022: A Puzzling High-Latitude X-Ray/Optical/Radio Source. *R. Doxsey, H. Bradt, J. McClintock, L. Petro, R. Remillard, G. Ricker, D. Schwartz, and K. Wood.* **264**, L43, 11-A14 (1983)
- WOOD, K. S. A Survey by HEAO 1 of Clusters of Galaxies. III. The Complete Abell Catalog. *M. W. Johnson, R. G. Crude, M. P. Ulmer, M. P. Kowalski, and K. S. Wood.* **266**, 425, 33-A5 (1983)
- H0547-14: X-Ray Flux from a Weak Gamma-Ray Burst? *C. Ambuster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman.* **269**, 779, 75-A6 (1983)
- WOOD, P. R. Long-Period Variables in the Galactic Bulge: Evidence for a Young Super-Metal-rich Population. *P. R. Wood and M. S. Bessell.* **265**, 748, 21-A1 (1983)
- Long-Period Variables in the Magellanic Clouds: Supergiants, AGB Stars, Supernova Precursors, Planetary Nebula Precursors, and Enrichment of the Interstellar Medium. *P. R. Wood, M. S. Bessell, and M. W. Fox.* **272**, 99, 102-B8 (1983)
- OH/IR Masers. IV. Evolution, Pulsation, and Nature of the Sources. *Terry J. Jones, A. R. Hyland, P. R. Wood, and Ian Gatley.* **273**, 669, 121-A1 (1983)
- WOODEN, DIANE H. An Ionization Gradient across the Front of M17 SW. *Daniel F. Lester, Harriet L. Dinerstein, David M. Rank, and Diane H. Wooden.* **275**, 130, 138-D13 (1983)
- WOODGATE, B. Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. *J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado.* **265**, 1066, 24-D5 (1983)
- WOODGATE, B. E. Simultaneous Ultraviolet Line and Hard X-Ray Bursts in the Impulsive Phase of Solar Flares. *B. E. Woodgate, R. A. Shine, A. I. Poland, and L. E. Orwig.* **265**, 530, 17-G1 (1983)
- WOODS, JACK. An Attempt to Determine Stellar Lyman-Alpha Emission-Line Fluxes for F Stars with Different Metal Abundances. *Erika Böhm-Vitense and Jack Woods.* **265**, 331, 15-F8 (1983)
- WOODS, R. C. The  $[\text{HCO}^+]/[\text{HOC}^+]$  Abundance Ratio in Molecular Clouds. *R. C. Woods, C. S. Gudeman, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarsson, L.-Å. Nyman, and H. Olofsson.* **270**, 583, 84-D14 (1983)
- WOOSLEY, S. E. The Thermonuclear Model for X-Ray Transients: Erratum. *R. K. Wallace, S. E. Woosley, and Thomas A. Weaver.* **264**, 746, 10-D10 (1983) (Orig. paper in **258**, 696, 81-A1)
- A Two-dimensional Supernova Model with Rotation and Nuclear Burning. *Peter Bodenheimer and S. E. Woosley.* **269**, 281, 68-C3 (1983)
- WOOTEN, A. Molecular Clouds on the Threshold of Star Formation: The Radial Density Profile of the Cores of the Rho Ophiuchi and R Coronae Australis Clouds. *Robert B. Loren, Aa. Sandkvist, and A. Wooten.* **270**, 620, 84-G9 (1983)
- WOOTEN, ALWYN. The Structure of Bright-rimmed Molecular Clouds. *Alwyn Wooten, Anneila Sargent, Gillian Knapp, and P. J. Huggins.* **269**, 147, 66-F4 (1983)
- Cyanoacetylene as a Density Probe of Molecular Clouds. *Paul A. Vanden Bout, Robert B. Loren, Ronald L. Snell, and Alwyn Wooten.* **271**, 161, 89-F7 (1983)
- WOOTEN, H. A. The Molecular Cloud Complex Associated with ON 1. *F. P. Israel and H. A. Wooten.* **266**, 580, 34-E10 (1983)
- Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wooten, C. Masson, and M. A. Frerking.* **273**, 633, 120-D13 (1983)
- WORDEN, SIMON P. The Magnetic Field on the RS Canum Venaticorum Star Lambda Andromedae. *Mark S. Giampapa, Leon Golub, and Simon P. Worden.* **268**, L121, 63-A10 (1983)
- WORRALL, D. M. Stellar Contributions to the Hard X-Ray Galactic Ridge. *D. M. Worrall and F. E. Marshall.* **267**, 691, 48-C11 (1983)
- WRIGHT, ALAN E. VLBI Observations of the Nucleus of Centaurus A. *Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **266**, L93, 39-B8 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. *Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **268**, L23, 57-B13 (1983)
- The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Battay, D. L. Jauncey, and David F. Malin.* **269**, 375, 70-E2 (1983)
- WRIGHT, CHRISTINE D. Predicted Infrared Brightness of Stars within 25 Parsecs of the Sun. *Hugh M. Johnson and Christine D. Wright.* **53**, 643, 25-D8 (1983) (Abstr. in **273**, 840, 122-F10)
- WRIGHT, M. C. H. Source of the High-Velocity Molecular Flow in Orion. *M. C. H. Wright, R. L. Plambeck, S. N. Vogel, P. T. P. Ho, and W. J. Welch.* **267**, L41, 45-E3 (1983)
- Positions of the SiO Masers in Orion-KL: Anisotropy on a Scale of 70 AU. *M. C. H. Wright and R. L. Plambeck.* **267**, L115, 51-D4 (1983)
- Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck.* **271**, L31, 93-C3 (1983)
- WRIGHT, MELVYN C. H. Formation of OB Clusters: OH Maser Observations. *Paul T. P. Ho, Aubrey D. Haschick, Stuart N. Vogel, and Melvyn C. H. Wright.* **265**, 295, 15-C14 (1983)
- WU, C. C. Interstellar Absorption Lines in the Spectrum of 3C 273. *D. G. York, C. C. Wu, S. Ratcliff, J. C. Blades, L. L. Cowie, and D. C. Morton.* **274**, 136, 125-D2 (1983)
- WU, CHI-CHAO. Prominent Ultraviolet Emission Lines from Type I Seyfert Galaxies. *Chi-Chao Wu, Albert Boggess, and Theodore R. Gull.* **266**, 28, 27-C5 (1983)
- High-Velocity Iron Absorption Lines in Supernova Remnant 1006. *Chi-Chao Wu, Marvin Leventhal, Craig L. Sarazin, and Theodore R. Gull.* **269**, L5, 69-A7 (1983)
- Ultraviolet Photometry of Dwarf Novae in Outburst. *Chi-Chao Wu and Robert J. Paneik.* **271**, 754, 97-F7 (1983)
- WU, S. T. Induced Mass and Wave Motions in the Lower Solar Atmosphere. I. Effects of Shear Motion of Flux Tubes. *S. T. Wu, Y. Q. Hu, Y. Nakagawa, and E. Tandberg-Hanssen.* **266**, 866, 37-G1 (1983)
- WYATT, S. P. Kinematics and Ages of Mira Variables in the Greater Solar Neighborhood. *S. P. Wyatt and J. H. Cahn.* **275**, 225, 139-E2 (1983)
- WYCKOFF, S. Optical and Radio Structure of the Quasar PKS 0812+02. *S. Wyckoff, K. Johnston, F. Ghigo, L. Rudnick, P. Wehinger, and A. Boksenberg.* **265**, 43, 12-E4 (1983)
- WYNN-WILLIAMS, C. G. The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams.* **274**, 168, 125-F6 (1983)
- YACKOVICH, F. H. The Cool DC White Dwarf Stein 2051B. *Gary Wegner and F. H. Yackovich.* **275**, 240, 139-F3 (1983)
- YAHIL, A. Nonlinear Evolution of Superclusters. *A. R. Rivolo and A. Yahil.* **274**, 474, 130-C8 (1983)

- YAHIL, AMOS. Self-similar Stellar Collapse. *Amos Yahil*. **265**, 1047, 24-B13 (1983)
- YAMASHITA, K. *see also* LAWRENCE, A., *et al*
- YAMASHITA, K. Observations of Centaurus X-3 by *Hakucho*. T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo. **264**, 563, 8-D8 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibazaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- YEE, H. K. C. Multicolor Surface Photometry of Markarian Seyfert Galaxies. H. K. C. Yee. **272**, 473, 107-A6 (1983)
- YEH, TYAN. Diamagnetic Force on a Flux Tube. *Tyan Yeh*. **264**, 630, 9-B12 (1983)
- YENTIS, D. J. H0547-14: X-Ray Flux from a Weak Gamma-Ray Burst? C. Ambruster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman. **269**, 779, 75-A6 (1983)
- YIN, Q. F. A Variable Radio Source in the Clumpy Irregular Galaxy Markarian 297. D. S. Heesch, J. Heidmann, and Q. F. Yin. **267**, L73, 51-A7 (1983)
- YOKOYAMA, T. *see* LAWRENCE, A., *et al*
- YORK, D. G. On the Possibility of Detecting Very Hot Gas through Absorption-Line Studies. D. G. York and L. L. Cowie. **264**, 49, 1-D12 (1983)
- Theoretical Oscillator Strengths for 21 Spin-forbidden Lines of C, N, O, Al, and Si: Erratum. Robert D. Cowan, L. M. Hobbs, and D. G. York. **265**, 582, 18-C13 (1983) (Orig. paper in **257**, 373, 65-A7)
- Interstellar Abundances of Oxygen and Nitrogen. D. G. York, L. Spitzer, R. C. Bohlin, J. Hill, E. B. Jenkins, B. D. Savage, and T. P. Snow. **266**, L55, 32-D8 (1983)
- Synthesis Maps of Ultraviolet Observations of Neutral Interstellar Gas. P. C. Frisch and D. G. York. **271**, L59, 100-B3 (1983)
- Two-dimensional Spectrophotometry of the Cores of X-Ray Luminous Clusters. L. L. Cowie, E. M. Hu, E. B. Jenkins, and D. G. York. **272**, 29, 101-C6 (1983)
- Interstellar Absorption Lines in the Spectrum of 3C 273. D. G. York, C. C. Wu, S. Ratcliff, J. C. Blades, L. L. Cowie, and D. C. Morton. **274**, 136, 125-D2 (1983)
- The Filaments of NGC 1275: A Collision between a Galaxy and an Accretion Flow? E. M. Hu, L. L. Cowie, P. Kaaret, E. B. Jenkins, D. G. York, and F. L. Roesler. **275**, L27, 148-A4 (1983)
- YORK, DONALD G. The Interstellar Medium near the Sun. III. Detailed Analysis of the Line of Sight to Lambda Scorpii. Donald G. York. **264**, 172, 2-F12 (1983)
- A Survey of Ultraviolet Interstellar Absorption Lines. Ralph C. Bohlin, Jesse K. Hill, Edward B. Jenkins, Blair D. Savage, Theodore P. Snow, Jr., Lyman Spitzer, Jr., and Donald G. York. **51**, 277, 6-B1 (1983) (Abstr. in **265**, 1135, 25-B11)
- YOSHIMURA, HIROKAZU. Dynamo Generation of Magnetic Fields in Three-Dimensional Space: Solar Cycle Main Flux Tube Formation and Reversals. *Hirokazu Yoshimura*. **52**, 363, 15-C13 (1983) (Abstr. in **270**, 778, 86-E5)
- YOUNG, ARTHUR. Detection of Flarelike Events and Their Relationship to Presumed Spot Regions of V471 Tauri: A Solar-Stellar Connection. Arthur Young, A. Klimke, John L. Africano, Rob Quigley, Richard R. Radick, and Dave Van Buren. **267**, 655, 48-A3 (1983)
- YOUNG, JUDITH S. The Molecular Gas Distribution in M51. Nick Scoville and Judith S. Young. **265**, 148, 13-F5 (1983)
- Structure of Dense Molecular Gas in TMC 1 from Observations of Three Transitions of HC<sub>3</sub>N. F. Peter Schloerb, Ronald L. Snell, and Judith S. Young. **267**, 163, 41-F7 (1983)
- CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville. **269**, 136, 66-E5 (1983)
- The Distribution of Molecular Clouds in the Nuclear Region of NGC 1068. N. Z. Scoville, Judith S. Young, and L. B. Lucy. **270**, 443, 83-A10 (1983)
- A 10 Micron Survey of Star Formation in Galactic Nuclei: Virgo Spiral Galaxies. N. Z. Scoville, E. E. Becklin, Judith S. Young, and R. W. Capps. **271**, 512, 95-B3 (1983)
- Curves for Analysis of the Two Lowest Rotational Transitions of Carbon Monoxide Using the Large Velocity Gradient Radiative Transfer Model. Paul F. Goldsmith, Judith S. Young, and William D. Langer. **51**, 203, 4-C1 (1983) (Abstr. in **264**, 748, 10-D12)
- YOUNG, L. E. V LBI Maps of 3C 273 and 3C 345 at 2.3 GHz. M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young. **272**, 383, 106-A5 (1983)
- YOUNGER, P. FRANK. A Search for OB Associations near Southern Long-Period Cepheids. II. CT Carinae, UU Muscae, VZ Puppis, SV Velorum, and EZ Velorum. Sidney van den Bergh, P. Frank Younger, Elmar B. F. Brosterhus, and Gonzalo Alcaïno. **53**, 765, 27-B1 (1983) (Abstr. in **274**, 921, 135-E2)
- YUNG, YUK L. An Analysis of the Reflection Spectrum of Jupiter from 1500 Å to 1740 Å. G. Randall Gladstone and Yuk L. Yung. **266**, 415, 31-D6 (1983)
- YUSHAK, S. M. A Measurement of the Energy Spectra and Relative Abundance of the Cosmic-Ray H and He Isotopes over a Broad Energy Range. W. R. Webber and S. M. Yushak. **275**, 391, 141-C1 (1983)
- ZAMORANI, G. X-Ray Studies of Quasars with the Einstein Observatory. III. The 3CR Sample. H. Tananbaum, J. F. C. Wardle, G. Zamorani, and Y. Avni. **268**, 60, 52-E9 (1983)
- Analysis of Complete Quasar Samples to Obtain Parameters of Luminosity and Evolution Functions. H. L. Marshall, Y. Avni, H. Tananbaum, and G. Zamorani. **269**, 35, 65-D2 (1983)
- Optical and X-Ray Observations of Faint Quasars in an Optically Selected Sample. H. L. Marshall, H. Tananbaum, G. Zamorani, J. P. Huchra, A. Braccetti, and V. Zitelli. **269**, 42, 65-D9 (1983)
- VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. Isabella M. Gioia, E. D. Feigelson, T. Maccararo, R. Schild, and G. Zamorani. **271**, 524, 95-C1 (1983)
- ZARRO, D. M. The Dependence of H $\alpha$  on Chromospheric Activity in G and K Main-Sequence Stars. D. M. Zarro. **267**, L61, 45-F6 (1983)
- Stellar Chromospheres: H $\alpha$  and Ca II K Profiles. D. M. Zarro and A. W. Rodgers. **53**, 815, 27-G1 (1983) (Abstr. in **274**, 922, 135-E3)
- ZHU, XINGFEN. The Distribution of Quasars from a Small Area Survey. *Yaoquan Chu and Xingfen Zhu*. **267**, 4, 40-A9 (1983)
- Does the Association of Quasars with Galaxies Depend on the Morphological Type of Galaxy? *Yaoquan Chu and Xingfen Zhu*. **271**, 507, 95-A12 (1983)
- ZIPOY, D. Measurements of Stratospheric Ethane in the Jovian South Polar Regions from Infrared Heterodyne Spectroscopy of the  $\nu_2$  Band near 12 Microns. T. Kostjuk, M. J. Mumma, F. Espenak, D. Deming, D. E. Jennings, W. Maguire, and D. Zipoy. **265**, 564, 18-B9 (1983)
- ZIRIN, H. Microwave and Hard X-Ray Imaging of a Solar Flare on 1980 November 5. P. Hoynig, K. A. Marsh, H. Zirin, and B. R. Dennis. **268**, 865, 62-E5 (1983)
- ZIRIN, HAROLD. He D $\gamma$  as a Diagnostic for the Hard and Soft X-Rays from Solar Flares. Uri Feldman, Margaret Liggett,



- and Harold Zirin. **271**, 832, 98-E5 (1983)  
The 1981 July 26-27 Flares: Magnetic Developments Leading to and Following Flares. *Harold Zirin*. **274**, 900, 135-B13 (1983)
- ZITELLI, V. Optical and X-Ray Observations of Faint Quasars in an Optically Selected Sample. *H. L. Marshall, H. Tananbaum, G. Zamorani, J. P. Huchra, A. Braccetti, and V. Zitelli*. **269**, 42, 65-D9 (1983)
- ZIURYS, L. M. A Search for  $^3\Pi$ ,  $N=1$ ,  $J=3/2$  Lambda-Doubling Transitions of CH. *L. M. Ziurys, C. Henkel, and R. J. Saykally*. **275**, 175, 139-A4 (1983)
- ZUCCARELLO, F. X-Ray Emission of Late-Type Stars. *L. Paternò and F. Zuccarello*. **275**, L1, 141-F2 (1983)
- ZUCKERMAN, B. Speckle Interferometry of IRC + 10216 in the Fundamental Vibration-Rotation Lines of CO. *H. M. Dyck, S. Beckwith, and B. Zuckerman*. **271**, L79, 100-C7 (1983)
- ZWAAN, C. Large-Scale Patterns Formed by Solar Active Regions during the Ascending Phase of Cycle 21. *V. Gaizauskas, K. L. Harvey, J. W. Harvey, and C. Zwaan*. **265**, 1056, 24-C8 (1983)
- ZWEIBEL, ELLEN G. The Propagation of Energetic Ions in Magnetic Loops and Gamma-Ray Emission from Solar Flares. *Ellen G. Zweibel and Deborah A. Haber*. **264**, 648, 9-D2 (1983)
- Hydromagnetic Wave Dissipation in Molecular Clouds. *Ellen G. Zweibel and Karl Josafatsson*. **270**, 511, 83-F12 (1983)



## SUBJECT HEADING TABLE OF CONTENTS

- Absolute Magnitudes: *see* Stars: Luminosities
- Absorption: *see* Opacities
- Abundances 97 1-G14
- Addenda: *see* Errata and Addenda
- Announcements: *see* Notices
- Astrometry 97 1-G14
- Atomic Processes 97 1-G14
- Autoionization: *see* Atomic Processes
  
- Black Holes 97 1-G14
- BL Lacertae Objects 98 2-A1
  
- Ca II Emission 98 2-A1
- Cataclysmic Stars: *see* Stars: Novae; Stars: U Geminorum
- Catalogs 98 2-A1
- Celestial Mechanics 98 2-A1
- Clusters: Abundances 98 2-A1
- Clusters: Associations 99 2-A2
- Clusters: Globular 99 2-A2
- Clusters: Open 100 2-A3
- Cluster-Type Variables: *see* Stars: RR Lyrae
- Comets 100 2-A3
- Convection 100 2-A3
- Cool Stars: *see* Stars: Late-Type
- Cosmic Background Radiation 100 2-A3
- Cosmic Rays: Abundances 101 2-A4
- Cosmic Rays: General 101 2-A4
- Cosmology 101 2-A4
  
- Dense Matter 103 2-A6
- Double Stars: *see* Stars: Binaries; Stars: Visual Multiples
  
- Early Universe 103 2-A6
- Earth: Airglow 103 2-A6
- Editorials: *see* Notices
- Elementary Particles 103 2-A6
- Equation of State 103 2-A6
- Equations: *see* Numerical Methods
- Errata and Addenda 103 2-A6
- Excitation and Ionization: *see* Atomic Processes
- Forbidden Lines: *see* Atomic Processes
- f*-Values: *see* Transition Probabilities
  
- Galaxies: Clustering 104 2-A7
- Galaxies: Evolution 106 2-A9
- Galaxies: Formation 106 2-A9
- Galaxies: General 106 2-A9
- Galaxies: Individual 107 2-A10
  - By Messier Numbers 107 2-A10
  - By NGC Numbers 107 2-A10
  - By Other Designation: Names 108 2-A11
  - By Other Designation: Alphanumeric 108 2-A11
- Galaxies: Intergalactic Medium 109 2-A12
- Galaxies: Internal Motions 109 2-A12
- Galaxies: Jets 110 2-A13
- Galaxies: Local Group 110 2-A13
- Galaxies: Magellanic Clouds 110 2-A13
- Galaxies: Milky Way 111 2-A14
- Galaxies: Nuclei 111 2-A14
- Galaxies: Photometry 113 2-B2
- Galaxies: Redshifts 114 2-B3
- Galaxies: Seyfert 114 2-B3
- Galaxies: Stellar Content 115 2-B4
- Galaxies: Structure 116 2-B5
- Galaxy, The: *see* Galaxies: Milky Way
- Gamma-Rays: Bursts 118 2-B7
- Gamma-Rays: General 118 2-B7
- Gas Dynamics: *see* Hydrodynamics
- Gravitation 119 2-B8
  
- Hydrodynamics 119 2-B8
- Hydromagnetics 120 2-B9
- Hyperfine Structure 121 2-B10
- H II Regions: *see* Nebulae: H II Regions
  
- Image Processing 121 2-B10
- Infrared: General 121 2-B10
- Infrared: Sources 121 2-B10
- Infrared: Spectra 123 2-B12
- Instabilities 123 2-B12
- Instruments 123 2-B12
- Interferometry 123 2-B12
- Interplanetary Medium 124 2-B13
- Interstellar: Abundances 124 2-B13
- Interstellar: Grains 125 2-B14
- Interstellar: Magnetic Fields 125 2-B14
- Interstellar: Matter 125 2-B14
- Interstellar: Molecules 127 2-C2
- Ionization: *see* Atomic Processes
  
- Laboratory Spectra 129 2-C4
- Line Formation 130 2-C5
- Line Identifications 130 2-C5
- Line Profiles 130 2-C5
- Luminosity Function 131 2-C6
  
- Magnetic Fields 131 2-C6
- Magnetohydrodynamics: *see* Hydromagnetics
- Masers 131 2-C6
- Mass-Luminosity Relation 132 2-C7
- Metal-Poor Stars: *see* Stars: Weak-Line
- Meteors and Meteorites 132 2-C7
- Microwave Radiation: *see* Radio Sources
- Mira Variables: *see* Stars: Long-Period Variables
- Molecular Processes 132 2-C7
- Moon 133 2-C8
  
- Nebulae: Abundances 133 2-C8
- Nebulae: Crab Nebula 133 2-C8
- Nebulae: General 133 2-C8
- Nebulae: H II Regions 134 2-C9
- Nebulae: Individual 135 2-C10
  - By Messier Number 135 2-C10

- By NGC Number 135 2-C10  
 By Other Designation: Names 135 2-C10  
 By Other Designation: Alphanumeric 136 2-C11  
 Nebulae: Orion Nebula 136 2-C11  
 Nebulae: Planetary 137 2-C12  
 Nebulae: Reflection 137 2-C12  
 Nebulae: Supernova Remnants 137 2-C12  
 Neutrinos 138 2-C13  
 Notices 138 2-C13  
 Nuclear Reactions 139 2-C14  
 Nucleosynthesis 139 2-C14  
 Numerical Methods 139 2-C14  
 Opacities 139 2-C14  
 Particle Acceleration 140 2-D1  
 Photometry 140 2-D1  
 Planets: Abundances 140 2-D1  
 Planets: Atmospheres 141 2-D2  
 Planets: Charged Particles 141 2-D2  
 Planets: General 141 2-D2  
 Planets: Interiors 141 2-D2  
 Planets: Jupiter 141 2-D2  
 Planets: Magnetospheres 141 2-D2  
 Planets: Pluto 141 2-D2  
 Planets: Satellites 141 2-D2  
 Planets: Saturn 141 2-D2  
 Planets: Spectra 141 2-D2  
 Planets: Uranus 141 2-D2  
 Planets: Venue 141 2-D2  
 Plasmas 141 2-D2  
 Proper Motions: *see* Stars: Proper-Motion; Stars: Stellar Dynamics  
 Pulsars 143 2-D4  
 Quantum Mechanics 144 2-D5  
 Quasars 144 2-D5  
 Radar Astronomy 146 2-D7  
 Radial Velocities 146 2-D7  
 Radiation Mechanisms 146 2-D7  
 Radiative Transfer 148 2-D9  
 Radio Sources: Extended 149 2-D10  
 Radio Sources: Galaxies 149 2-D10  
 Radio Sources: General 150 2-D11  
 Radio Sources: Identifications 150 2-D11  
 Radio Sources: Lines 150 2-D11  
 Radio Sources: Spectra 151 2-D12  
 Radio Sources: 21 cm Radiation 151 2-D12  
 Radio Sources: Variable 152 2-D13  
 Relativity 152 2-D13  
 Rotation 152 2-D13  
 Shock Waves 153 2-D14  
 Sky Photographs 153 2-D14  
 Solar System: General 153 2-D14  
 Spectrophotometry 153 2-D14  
 Spiral Structure: *see* Galaxies: Structure  
 SS Cygni Stars: *see* Stars: U Geminorum  
 Stars: Abundances 154 2-E1  
 Stars: Accretion 155 2-E2  
 Stars: Atmospheres 156 2-E3  
 Stars: Ba II 156 2-E3  
 Stars: Be 156 2-E3  
 Stars:  $\beta$  Cephei 156 2-E3  
 Stars: Binaries 156 2-E3  
 Stars: Carbon 158 2-E5  
 Stars: Catalogs 158 2-E5  
 Stars: Cepheids 158 2-E5  
 Stars: Chromospheres 158 2-E5  
 Stars: Circumstellar Shells 159 2-E6  
 Stars: Collapsed 159 2-E6  
 Stars: Combination Spectra 159 2-E6  
 Stars: Coronae 159 2-E6  
 Stars: Diameters 160 2-E7  
 Stars: Dwarf Novae 160 2-E7  
 Stars: Early-Type 160 2-E7  
 Stars: Eclipsing Binaries 161 2-E8  
 Stars: Emission-Line 161 2-E8  
 Stars: Evolution 162 2-E9  
 Stars: Faint Blue 163 2-E10  
 Stars: Flare 163 2-E10  
 Stars: Formation 163 2-E10  
 Stars: High-Velocity 164 2-E11  
 Stars: Horizontal Branch 164 2-E11  
 Stars: Hydrogen Deficient 165 2-E12  
 Stars: Individual 165 2-E12  
 By Constellation Name 165 2-E12  
 By Bright Star Number 165 2-E12  
 By Henry Draper Number 166 2-E13  
 By Other Designation 167 2-E14  
 Stars: Interiors 167 2-E14  
 Stars: Late-Type 168 2-F1  
 Stars: Long-Period Variables 169 2-F2  
 Stars: Luminosities 169 2-F2  
 Stars: Magnetic 170 2-F3  
 Stars: Massive 170 2-F3  
 Stars: Mass Loss 170 2-F3  
 Stars: Metallic-Line 171 2-F4  
 Stars: Neutron 171 2-F4  
 Stars: Novae 172 2-F2  
 Stars: Of-Type 172 2-F5  
 Stars: Peculiar A 172 2-F5  
 Stars: Population II 172 2-F5  
 Stars: Pre-Main-Sequence 172 2-F5  
 Stars: Proper-Motion 173 2-F6  
 Stars: Pulsation 173 2-F6  
 Stars: Radio Radiation 174 2-F7  
 Stars: Rotation 174 2-F7  
 Stars: RR Lyrae 175 2-F8  
 Stars: Spectral Classification 175 2-F8  
 Stars: Spectrum Variables 175 2-F8  
 Stars: Stellar Dynamics 175 2-F8  
 Stars: Stellar Statistics 176 2-F9  
 Stars: Subdwarfs 176 2-F9  
 Stars: Supergiants 176 2-F9  
 Stars: Supernovae 176 2-F9  
 Stars: U Geminorum 177 2-F10  
 Stars: Variables 177 2-F10  
 Stars: Visual Multiples 177 2-F10  
 Stars: Weak-Line 177 2-F10  
 Stars: White Dwarfs 177 2-F10  
 Stars: Winds 178 2-F11  
 Stars: Wolf-Rayet 179 2-F12  
 Sun: Abundances 179 2-F12  
 Sun: Activity 179 2-F12  
 Sun: Atmosphere 179 2-F12  
 Sun: Atmospheric Motions 180 2-F13  
 Sun: Chromosphere 180 2-F13  
 Sun: Corona 180 2-F13  
 Sun: Eclipses 181 2-F14  
 Sun: Faculae 181 2-F14  
 Sun: Flares 181 2-F14  
 Sun: General 182 2-G1  
 Sun: Granulation 182 2-G1  
 Sun: Interior 182 2-G1  
 Sun: Magnetic Fields 182 2-G1  
 Sun: Prominences 183 2-G2



Sun: Radio Radiation 183 2-G2

Sun: Rotation 183 2-G2

Sun: Solar Wind 183 2-G2

Sun: Spectra 184 2-G3

Sun: Spectropheliogram 184 2-G3

Sun: Sunspots 184 2-G3

Sun: X-Rays 184 2-G3

Symbiotic Stars: *see* Stars: Combination Spectra

$3^\circ$  Cosmic Radiation: *see* Cosmic Background Radiation

Transition Probabilities 185 2-G4

T Tauri Stars: *see* Stars: Pre-Main-Sequence

Turbulence 185 2-G4

Ultraviolet: General 185 2-G4

Ultraviolet: Spectra 185 2-G4

W Virginis Stars: *see* Stars: Cepheids

X-Rays: Binaries 188 2-G7

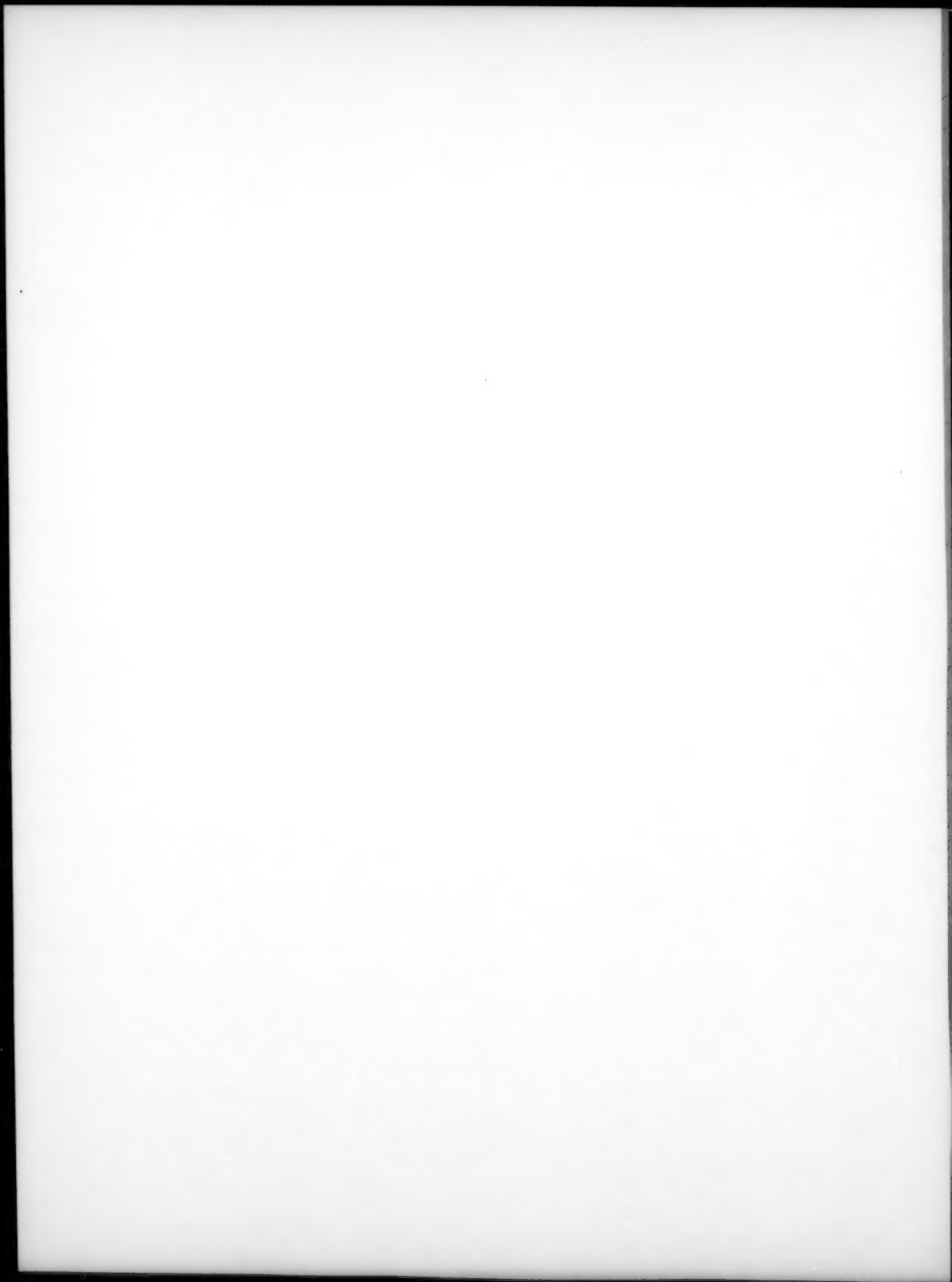
X-Rays: Bursts 189 2-G8

X-Rays: General 189 2-G8

X-Rays: Sources 189 2-G8

X-Rays: Spectra 192 2-G11

Zeeman Effect 192 2-G11



## SUBJECT INDEX

**Absolute Magnitudes:** see **Stars: Luminosities**

**Absorption:** see **Opacities**

### **Abundances**

- Extinct Radioactivities: A Three-Phase Mixing Model. *Donald D. Clayton*. **268**, 381, 56-A12 (1983)
- High-Resolution Spectra of C<sub>2</sub> Swan Bands from Comet West 1976 VI. *David L. Lambert and A. C. Danks*. **268**, 428, 56-E5 (1983)
- r-Process Abundances near the Mass 130 Peak. *J. R. De Laeter and K. J. R. Rosman*. **270**, 746, 86-C1 (1983)
- The 0.9–2.5 Micron Spectrum of Comet West 1976 VI. *James R. Johnson, Uwe Fink, and Harold P. Larson*. **270**, 769, 86-D10 (1983)
- Cross Section for the Reaction <sup>12</sup>C(e,p)<sup>11</sup>B and Its Relevance to the Formation of <sup>11</sup>B in Active Galaxies. *Dieter H. H. Hoffmann, Achim Richter, Gerhard Schrieder, and Klaus Seegebarth*. **271**, 398, 92-C8 (1983)
- Spectrophotometry of 12 Metal-poor Galaxies: Implications for the Primordial Helium Abundance. *Daniel Kunth and Wallace L. W. Sargent*. **273**, 81, 113-A7 (1983)
- The Oxygen Abundance in the Clouds Producing the Ly $\alpha$ -Ly $\beta$  Absorption Systems in the Quasars 4C 5.34 (0805+046) and OQ 172 (1442+101). *John Norris, F. D. A. Hartwick, and B. A. Peterson*. **273**, 450, 118-D4 (1983)

**Addenda:** see **Errata and Addenda**

**Announcements:** see **Notices**

### **Astrometry**

- The Astrometric Position of T Tauri and the Nature of Its Companion. *Robert B. Hanson, B. F. Jones, and D. N. C. Lin*. **270**, L27, 81-B13 (1983)

### **Atomic Processes**

- Oscillator Strengths and Collision Strengths for O II and O III. *Y. K. Ho and Ronald J. W. Henry*. **264**, 733, 10-C11 (1983)
- Theoretical Oscillator Strengths for 21 Spin-forbidden Lines of C, N, O, Al, and Si: Erratum. *Robert D. Cowan, L. M. Hobbs, and D. G. York*. **265**, 582, 18-C13 (1983) (Orig. paper in **257**, 373, 65-A7)
- Inner-Shell Transitions in Fe XIX–XXII in the X-Ray Spectra of Solar Flares and Tokamaks. *K. J. H. Phillips, J. R. Lemen, R. D. Cowan, G. A. Doschek, and J. W. Leibacher*. **265**, 1120, 25-A10 (1983)
- Invalidity of Local Thermodynamic Equilibrium for Electrons in the Solar Transition Region. I. Fokker-Planck Results. *Edward C. Shoub*. **266**, 339, 30-E12 (1983)
- Formation of the Cl I Lines at 1351 Å in the Solar Chromosphere. *R. A. Shine*. **266**, 882, 38-A5 (1983)
- Comptonization Effects in Spherical Accretion onto Black Holes. *James R. Ipser and Richard H. Price*. **267**, 371, 43-G11 (1983)
- Oscillator Strengths and Collision Strengths for S II. *Y. K. Ho and Ronald J. W. Henry*. **267**, 886, 50-D8 (1983)
- Effect of Screening Due to Free Mobile Charges on the Binding Energy of an H<sup>+</sup> Ion. *Dwight E. Phelps and K. K. Bajaj*. **268**, 447, 56-F11 (1983)
- Charge Exchange in Solar Wind–Cometary Interactions. *T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and*

*A. F. Nagy*. **268**, 889, 62-G1 (1983)

- X-Ray Line Ratios from Helium-like Ions: Updated Theory and SMM Flare Observations. *C. J. Wolfson, J. G. Doyle, J. W. Leibacher, and K. J. H. Phillips*. **269**, 319, 68-F2 (1983)
- The <sup>1</sup>D $\rightarrow$ <sup>3</sup>P Transition in Atomic Oxygen Induced by Collisions with Atomic Hydrogen. *S. R. Federman and E. J. Shipsey*. **269**, 791, 75-B4 (1983)
- Oscillator Strengths of 3p<sup>3</sup>3d<sup>1</sup>D $\rightarrow$ 3p<sup>3</sup>3d4s <sup>1</sup>P<sup>o</sup>, <sup>3</sup>D<sup>o</sup>, <sup>3</sup>F<sup>o</sup> Transitions in Cr VI, Mn VII, and Fe VIII. *S. N. Tiwary*. **269**, 803, 75-C2 (1983)
- Radiative Recombination of the Ground State of Lithium-like Ions. *A. K. Pradhan*. **270**, 339, 80-E8 (1983)
- The Effect of a Non-Maxwellian Electron Distribution on Oxygen and Iron Ionization Balances in the Solar Corona. *S. P. Owocki and J. D. Scudder*. **270**, 758, 86-C13 (1983)
- Scaling Laws for Hydrogen-like Atoms in Magnetic Fields of Arbitrary Strength. *J. M. Wadehra*. **271**, 879, 99-B1 (1983)
- Comments on the Planck-Larkin Partition Function. *Carl A. Rouse*. **272**, 377, 105-B4 (1983)
- Oscillator Strengths of 3p<sup>3</sup>3d<sup>1</sup>D $\rightarrow$ 3p<sup>3</sup>3d4s <sup>1</sup>P<sup>o</sup>, <sup>3</sup>F<sup>o</sup> Transitions in Co IX, Cu XI, and Zn XII Ions. *S. N. Tiwary*. **272**, 781, 110-C6 (1983)
- Electrical and Thermal Conductivities of Dense Matter in the Liquid Metal Phase. I. High-Temperature Results. *Naoki Itoh, Shinichi Mitake, Hiroshi Iyetomi, and Setsuo Ichimaru*. **273**, 774, 122-A10 (1983)
- Lines of Fe XII Sensitive to Coronal Electron Density. *U. Feldman, Leonard Cohen, and G. A. Doschek*. **273**, 822, 122-E4 (1983)
- Si III Line Ratios in the Sun. *P. L. Dufton, A. Hibbert, A. E. Kingston, and G. A. Doschek*. **274**, 420, 128-C9 (1983)
- Coulomb Thermal Properties and Stability of the Io Plasma Torus. *D. D. Barbosa, F. V. Coroniti, and A. Eviatar*. **274**, 429, 128-D4 (1983)
- Charge Exchange in Solar Wind–Cometary Interactions: Erratum. *T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy*. **274**, 919, 135-D14 (1983) (Orig. paper in **268**, 889, 63-A1)
- New Identifications of Allowed 2p<sup>2</sup>3l–2p<sup>3</sup>3l' Transitions and Forbidden 2p<sup>2</sup>3s(<sup>1</sup>P<sub>1</sub>–<sup>3</sup>P<sub>1</sub>) Coronal Lines in the Ne I Sequence. *Sidney O. Kastner*. **275**, 922, 147-E9 (1983)
- IUE Spectrum of the Io Torus: Identification of the <sup>1</sup>S<sub>2,1</sub> Transitions of S III. *H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou*. **275**, L19, 141-G4 (1983)
- Line Radiation from a Hot, Optically Thin Plasma: Collision Strengths and Emissivities. *T. J. Gaetz and E. E. Salpeter*. **52**, 155, 11-D9 (1983) (Abstr. in **268**, 906, 63-A9)
- Electron Excitation Rates Among Fine Structure Levels in O III. *K. M. Aggarwal*. **52**, 387, 15-F1 (1983) (Abstr. in **270**, 779, 86-E6)

**Autoionization:** see **Atomic Processes**

### **Black Holes**

- The Dynamics and Fueling of Active Nuclei. *Colin Norman and Joseph Silk*. **266**, 502, 33-F14 (1983)
- Spherical Accretion onto Quasars. *Julian H. Krolik and Rich-*

**Black Holes—Continued**

- ard A. London. **267**, 18, 40-B9 (1983)
- Comptonization Effects in Spherical Accretion onto Black Holes. James R. Ipser and Richard H. Price. **267**, 371, 43-G11 (1983)
- Monte Carlo Simulations of the Evolution of Galactic Nuclei Containing Massive, Central Black Holes. Martin J. Duncan and Stuart L. Shapiro. **268**, 565, 59-C1 (1983)
- Gravitational Radiation from Particles Falling along the Symmetry Axis into a Kerr Black Hole: The Momentum Radiated. Takashi Nakamura and Mark P. Haugan. **269**, 292, 68-C14 (1983)
- The Infall of a Star into a Massive Black Hole. R. A. Nolthenius and J. I. Katz. **269**, 297, 68-D5 (1983)
- The Relationship between the X-Ray and Optical Luminosities for QSOs. W. H. Tucker. **271**, 531, 95-C8 (1983)
- The High-Energy Spectrum of Hot Accretion Disks. Jean A. Eilek and Minas Kafatos. **271**, 804, 98-C5 (1983)
- Discovery of a Massive Unseen Star in LMC X-3. A. P. Cowley, D. Crampton, J. B. Hutchings, R. Remillard, and J. E. Penfold. **272**, 118, 102-C13 (1983)
- The Dynamics of Dissipatively Heated Spherical Accretion. Ernst T. Scharlemann. **272**, 279, 104-A9 (1983)
- On Tidal Detonation of Stars by Massive Black Holes. G. V. Bicknell and R. A. Gingold. **273**, 749, 121-F13 (1983)
- Shocks and Spherically Accreting Black Holes: A Model for Classical Quasars. P. Mészáros and J. P. Ostriker. **273**, L59, 123-A12 (1983)
- Mass of Large Magellanic Cloud X-3. Bohdan Paczyński. **273**, L81, 123-C3 (1983)
- A Thermal Interpretation of the X-Ray Spectra of Quasars, Active Galactic Nuclei, and Cygnus X-1. P. Mészáros. **274**, L13, 129-A12 (1983)
- X-Ray Observations of LMC X-3 with the Monitor Proportional Counter aboard the HEAO 2 Einstein Observatory: A Comparison with Cygnus X-1. M. C. Weisskopf, S. M. Kahn, W. D. Darbro, R. F. Elsner, J. E. Grindlay, S. Narayan, P. G. Sutherland, and A. C. Williams. **274**, L65, 136-B7 (1983)
- Formation of Population III Stars and Galaxies with Primordial Planetary-Mass Black Holes. Katherine Freese, Richard Price, and David N. Schramm. **275**, 405, 142-A5 (1983)
- BL Lacertae Objects**
- The Absence of Rapid X-Ray Variability in Active Galaxies. Allyn F. Tennant and R. F. Mushotzky. **264**, 92, 2-A1 (1983)
- Low Frequency Asymptotic Spectra of Multiple, Decelerating Adiabatic Bursts. Peter D. Usher, Ke-Liang Huang, Kenneth J. Mitchell, and Joseph T. Pollock. **264**, 451, 7-C2 (1983)
- The Arc Second Radio Structure of 12 BL Lacertae Objects. J. S. Ulvestad, K. J. Johnston, and K. W. Weiler. **266**, 18, 27-B9 (1983)
- Studies of BL Lacertae Objects with the Einstein X-Ray Observatory: The Absolute Volume Density. Daniel A. Schwartz and William H.-M. Ku. **266**, 459, 33-C13 (1983)
- Why Are Broad Emission Lines Seen in Seyfert Galaxies and Not in BL Lacertae Objects? P. W. Guilbert, A. C. Fabian, and Richard McCray. **266**, 466, 33-D6 (1983)
- Opacity Effects at Radio Wavelengths in the Quasar 1308 + 326. C. P. O'Dea, W. A. Dent, and T. J. Balonek. **266**, L1, 32-A2 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek. **268**, 68, 52-F3 (1983)
- The Discovery of an X-Ray Bright BL Lacertae Object: 0414 + 009. M. P. Ulmer, Robert L. Brown, D. A. Schwartz, J. Patterson, and R. G. Cruddace. **270**, L1, 81-A2 (1983)
- CCD Photometry of the BL Lacertae Object 1400 + 162 and the Associated Group of Galaxies. Donna Weistrop, David B. Shaffer, Harold J. Reitsema, and Bradford A. Smith. **271**, 471, 94-E11 (1983)
- VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. Isabella M. Gioia, E. D. Feigelson, T. Maccacaro, R. Schild, and G. Zamorani. **271**, 524, 95-C1 (1983)
- Optical Variability, Absolute Luminosity, and the Hubble Diagram for QSOs. Andrew J. Pica and Alex G. Smith. **272**, 11, 101-B2 (1983)
- The Optical Variability and Spectrum of PKS 2155 – 304. H. R. Miller and H. A. McAlister. **272**, 26, 101-C3 (1983)
- Reverse Stellar Evolution, Stellar Ablation, and the Origin of Gas in Quasars. William G. Mathews. **272**, 390, 106-A12 (1983)
- The X-Ray Spectra of the BL Lacertae Objects PKS 0548 – 322 and 3C 66A. Dario Maccagni, Tommaso Maccacaro, and Massimo Tarengi. **273**, 70, 112-G8 (1983)
- X-Ray and UV Observations of the BL Lacertae Object 3C 66A. D. Maccagni, L. Maraschi, E. G. Tanzi, M. Tarengi, and L. Chiappetti. **273**, 75, 113-A1 (1983)
- C IV Absorption in the High-Redshift BL Lac Object 0215 + 015. II. New Observations at 20 km s<sup>-1</sup> Resolution. Max Pettini, Richard W. Hunstead, Hugh S. Murdoch, and J. Chris Blades. **273**, 436, 118-C3 (1983)
- A Cosmological Test: Its Application to Quasars and Estimates of  $q_0$ . Ermanno F. Borra. **273**, L55, 123-A8 (1983)
- Test of a Class of Models for the Variable Absorption Lines in AO 0235 + 164. F. H. Briggs. **274**, 86, 124-G8 (1983)
- Dramatic Variations in the Polarization of BL Lacertae: Shocks and Gas? Hugh D. Aller, Phillip E. Hodge, and Margo F. Aller. **274**, L19, 129-B3 (1983)
- X-Ray Studies of BL Lacertae Objects with the Einstein Observatory: Confrontation with the Synchrotron Self-Compton Predictions. Greg M. Madejski and Daniel A. Schwartz. **275**, 467, 142-E12 (1983)
- Ca II Emission**
- Discovery of Eclipses in the X-Ray Source HD 155638. Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry. **270**, L79, 87-D8 (1983)
- Chromospheric and Coronal Emissions from the Giants in the Hyades. S. L. Baliunas, L. Hartmann, and A. K. Dupree. **271**, 672, 96-G4 (1983)
- High Spatial and Temporal Resolution Observations of the Solar Ca II H Line. L. E. Cram and Luc Damé. **272**, 355, 104-G7 (1983)
- Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. Sallie L. Baliunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning. **275**, 752, 145-F7 (1983)
- Rotational Studies of Late-Type Stars. II. Ages of Solar-Type Stars and the Rotational History of the Sun. David R. Soderblom. **53**, 1, 17-A3 (1983) (Abstr. in **271**, 889, 99-B11)
- Stellar Chromospheres: H $\alpha$  and Ca II K Profiles. D. M. Zarro and A. W. Rodgers. **53**, 815, 27-G1 (1983) (Abstr. in **274**, 922, 135-E3)
- Cataclysmic Stars: see Stars: Novae; Stars: U Geminorum Catalogs**
- Radial Velocities of Planetary Nebulae. Stephen E. Schneider, Yervant Terzian, A. Purgathofer, and M. Perinotto. **52**, 399, 15-G5 (1983) (Abstr. in **270**, 779, 86-E6)
- Celestial Mechanics**
- Conservative Mass Transfer in Close Binary Systems. I. Equations of Motion for Spin and Orbital Angular Momenta. John J. Matese and Daniel P. Whitmire. **266**, 776, 36-F13 (1983)
- Clusters: Abundances**
- Metal Abundances of RR Lyrae Stars in Globular Clusters: Erratum. Horace A. Smith and George J. Perkins. **267**, 891,



50-D13 (1983) (Orig. paper in **261**, 576, 118-A8)

# Clusters: Associations

X-Rays and Rotation among Post-T Tauri G Stars in Orion Ic. *Myron A. Smith, Steven H. Pravdo, and William H.-M. Ku.* **272**, 163, 102-G2 (1983)

Cepheids in Open Clusters and Associations. *J. D. Fernie and R. McGonegal.* **275**, 732, 145-E1 (1983)

A Search for OB Associations near Southern Long-Period Cepheids. II. CT Carinae, UU Muscae, VZ Puppis, SV Velorum, and EZ Velorum. *Sidney van den Bergh, P. Frank Younger, Elmar B. F. Brosterhus, and Gonzalo Alcaïno.* **53**, 765, 27-B1 (1983) (Abstr. in **274**, 921, 135-E2)

# Clusters: Globular

A Search for Globular Clusters around the Edge-on Spiral Galaxy NGC 55. *William Liller and Gonzalo Alcaïno.* **264**, 53, 1-E2 (1983)

The Ages and Compositions of Old Clusters. *Kenneth Janes and Pierre Demarque.* **264**, 206, 3-B6 (1983)

The Cyanogen Distribution of the Red Giants in M5. *Graeme H. Smith and John Norris.* **264**, 215, 3-C1 (1983)

H $\alpha$  Emission and Mass Loss from Metal-poor Giants. *Raffaele G. Gratton.* **264**, 223, 3-C9 (1983)

Evolutionary Effects of Helium Diffusion in Population II Stars. *Guy S. Stringfellow, Peter Bodenheimer, Peter D. Noerdlinger, and Richard J. Arigo.* **264**, 228, 3-C14 (1983)

Age Calibrations of Magellanic Cloud Clusters. *P. W. Hodge.* **264**, 470, 7-D10 (1983)

Stability Limits for "Isothermal" Cores in Globular Cluster Models: Two-Component Systems. *J. Katz and L. G. Taff.* **264**, 476, 7-E2 (1983)

A Search for Globular Clusters around the Edge-on Late-Type Spiral Galaxy NGC 253. *William Liller and Gonzalo Alcaïno.* **265**, 166, 13-G9 (1983)

Radial Velocities of a Random Sample of K Giant Stars and Implications Concerning Multiplicity among Giant Stars in Clusters. *Hugh C. Harris and Robert D. McClure.* **265**, L77, 26-D6 (1983)

Faint Star Studies in the Magellanic Clouds. I. RICHFLD Photographic Photometry in NGC 2257. *L. L. Stryker.* **266**, 82, 27-G3 (1983)

Double-Mode RR Lyrae Variables in M15. *Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy.* **266**, 94, 28-A4 (1983)

Photometric Studies of Composite Stellar Systems. V. Infrared Photometry of Star Clusters in the Magellanic Clouds. *S. E. Persson, M. Aaronson, Judith G. Cohen, Jay A. Frogel, and K. Matthews.* **266**, 105, 28-B2 (1983)

The Chemical Inhomogeneity of M22. *John Norris and K. C. Freeman.* **266**, 130, 28-D5 (1983)

Carbon and Nitrogen Abundances in Giant Stars of the Metal-poor Globular Cluster M15. *Charles F. Trefzger, Duane F. Carbon, G. E. Langer, Nicholas B. Suntzeff, and Robert P. Kraft.* **266**, 144, 28-E6 (1983)

On Searches for Pulsed Emission with Application to Four Globular Cluster X-Ray Sources: NGC 1851, 6441, 6624, and 6712. *D. A. Leahy, W. Darbro, R. F. Elsner, M. C. Weisskopf, P. G. Sutherland, S. Kahn, and J. E. Grindlay.* **266**, 160, 28-F9 (1983)

X-Ray Evidence for White Dwarf Binaries in Globular Clusters. *Paul Hertz and Jonathan E. Grindlay.* **267**, L83, 51-B2 (1983)

Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart.* **267**, L89, 51-B7 (1983)

Survey of H $\alpha$  Emission in Globular Cluster Red Giants. *C. Cacciari and K. C. Freeman.* **268**, 185, 54-A7 (1983)

The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. II. Comparisons of Metric and Photometric Scale Lengths and Three Further Tests of the Long and Short

Distance Scales. *G. de Vauconleurs.* **268**, 468, 58-B8 (1983)

Color-Magnitude Photometry of 47 Tucanae to  $M_V = +9$ . *William E. Harris, James E. Hesser, and Bruce Atwood.* **268**, L111, 64-A1 (1983)

Spectroscopic Analysis of Dwarf and Subgiant Stars in 47 Tucanae. *R. A. Bell, James E. Hesser, and R. D. Cannon.* **269**, 580, 72-F13 (1983)

Abundances in Globular Cluster Red Giants. V. The Metal-rich Globular Clusters. *Judith G. Cohen.* **270**, 654, 85-C4 (1983)

Core Collapse with Strong Encounters. *Jeremy Goodman.* **270**, 700, 85-F10 (1983)

The Velocity Dispersion of the Globular Clusters in the Fornax Dwarf Galaxy. *Judith G. Cohen.* **270**, L41, 87-A12 (1983)

The Evolutionary State and Pulsation Characteristics of Red Variables in Globular Clusters. *Jay A. Frogel.* **272**, 167, 102-G6 (1983)

The Ellipticities of Globular Clusters and the Second Parameter Problem. *John Norris.* **272**, 245, 103-F3 (1983)

Globular Cluster Systems in the Hydra I Elliptical Galaxies. II. *William E. Harris, Malcolm G. Smith, and Eric S. Myra.* **272**, 456, 106-F13 (1983)

The Kinematics of Globular Clusters in the Large Magellanic Cloud. *K. C. Freeman, Garth Illingworth, and Augustus Oemler, Jr.* **272**, 488, 107-B7 (1983)

The Al i-Cyanogen Correlation in the Spectra of Globular Cluster Red Giants and the Origin of Intercluster Heavy Element Variations. *John Norris and Graeme H. Smith.* **272**, 635, 108-F8 (1983)

The Chemical Composition of Distant Globular Clusters: Are There Any Metal-poor Clusters? *Catherine A. Pilachowski, Gregory D. Bothun, Edward W. Olszewski, and Andrew Odell.* **273**, 187, 114-C5 (1983)

The Chemical Inhomogeneity of M22: Erratum. *John Norris and K. C. Freeman.* **273**, 837, 122-F6 (1983) (Orig. paper in **266**, 130, 28-D5)

A Second Cataclysmic Variable in a Globular Cluster. *Bruce Margon and Ronald A. Downes.* **274**, L31, 129-C6 (1983)

The Age and Composition of the LMC Red Globular Cluster NGC 2121. *Phillip Flower, Douglas Geisler, Paul Hodge, Edward Olszewski, and Robert Schommer.* **275**, 15, 137-B7 (1983)

Spectrophotometry of M33 Clusters. *C. A. Christian and R. A. Schommer.* **275**, 92, 138-A11 (1983)

An X-Ray Survey of Globular Clusters and Their X-Ray Luminosity Function. *Paul Hertz and Jonathan E. Grindlay.* **275**, 105, 138-B13 (1983)

The Cyanogen Distribution of the Giants in NGC 2808. *John Norris and Graeme H. Smith.* **275**, 120, 138-D1 (1983)

The Rotation of Horizontal-Branch Stars. II. Members of the Globular Clusters M3, M5, and M13. *Ruth C. Peterson.* **275**, 737, 145-E6 (1983)

Globular Cluster Giant Branches and the Metallicity Scale. *Jay A. Frogel, Judith G. Cohen, and S. E. Persson.* **275**, 773, 146-A9 (1983)

Star Clusters and Stellar Evolution. I. Improved Synthetic Color-Magnitude Diagrams for the Oldest Clusters. *Don A. Vandenberg.* **51**, 29, 1-D1 (1983) (Abstr. in **263**, 1006, 142-F7)

Color-Magnitude Studies of Globular Clusters. I. The Bright Stars in NGC 362: Erratum. *William E. Harris.* **51**, 269, 5-C1 (1983) (Orig. paper in **50**, 573, 31-D1)

The Chemical Composition of Stars in Globular Clusters. *Catherine A. Pilachowski, Christopher Sneden, and George Wallerstein.* **52**, 241, 12-G9 (1983) (Abstr. in **269**, 810, 75-C9)

Infrared Photometry, Bolometric Luminosities, and Effective Temperatures for Giant Stars in 26 Globular Clusters. *Jay A. Frogel, S. E. Persson, and Judith G. Cohen.* **53**, 713, 26-B9 (1983) (Abstr. in **273**, 841, 122-F11)

Multichannel Spectrometer Observations of Globular Cluster

**Clusters: Globular—Continued**

Horizontal-Branch A Stars. *D. S. Hayes and A. G. Davis Philip*. **53**, 759, 27-A10 (1983) (Abstr. in **274**, 921, 135-E2)

**Clusters: Open**

The Ages and Compositions of Old Clusters. *Kenneth Janes and Pierre Demarque*. **264**, 206, 3-B6 (1983)

Age Calibrations of Magellanic Cloud Clusters. *P. W. Hodge*. **264**, 470, 7-D10 (1983)

Formation of OB Clusters: OH Maser Observations. *Paul T. P. Ho, Aubrey D. Haschick, Stuart N. Vogel, and Melvyn C. H. Wright*. **265**, 295, 15-C14 (1983)

Photometric Studies of Composite Stellar Systems. V. Infrared Photometry of Star Clusters in the Magellanic Clouds. *S. E. Persson, M. Aaronson, Judith G. Cohen, Jay A. Frogel, and K. Matthews*. **266**, 105, 28-B2 (1983)

NGC 752 and Main-Sequence Bimodality. *Bruce A. Twarog*. **267**, 207, 42-B10 (1983)

Formation of OB Clusters: W33 Complex. *Aubrey D. Haschick and Paul T. P. Ho*. **267**, 638, 47-F13 (1983)

Dynamical Constraints on Star Formation Efficiency. *Robert D. Mathieu*. **267**, L97, 51-C2 (1983)

A Rotating Protocluster in W58: HCO<sup>+</sup> Aperture Synthesis Maps. *S. N. Vogel and W. J. Welch*. **269**, 568, 72-F1 (1983)

A Comparison between Observed and Theoretical H-R Diagrams for the Young LMC Star Cluster NGC 1866. *Stephen A. Becker and Grant J. Mathews*. **270**, 155, 78-E12 (1983)

Ultraviolet Flux Distributions of Stars in the Orion Nebula Cluster. *Robert J. Panek*. **270**, 169, 78-F14 (1983)

Studies of Extremely Young Clusters. VII. Spectroscopic Observations of Faint Stars in the Orion Nebula. *Merle F. Walker*. **271**, 642, 96-E2 (1983)

Lithium Abundance and Age Spread in the Pleiades. *Douglas K. Duncan and Burton F. Jones*. **271**, 663, 96-F9 (1983)

Chromospheric and Coronal Emissions from the Giants in the Hyades. *S. L. Baliunas, L. Hartmann, and A. K. Dupree*. **271**, 672, 96-G4 (1983)

Confirmation among Visual Multiples of an Increase of Ap Stars with Age. *Helmut A. Abt and Octavio Cardona*. **272**, 182, 103-A8 (1983)

The Nature of R136a, the Superluminous Central Object of the 30 Doradus Nebula. *Blair D. Savage, Edward L. Fitzpatrick, Joseph P. Cassinelli, and Dennis C. Ebets*. **273**, 597, 120-B1 (1983)

Faint Stellar Photometry in Clusters. I. NGC 2204 and E3. *Jay A. Frogel and Bruce A. Twarog*. **274**, 270, 126-F11 (1983)

The Discovery of New Embedded Sources in the Centrally Condensed Core of the Rho Ophiuchi Dark Cloud: The Formation of a Bound Cluster? *Bruce A. Wilking and Charles J. Lada*. **274**, 698, 133-A11 (1983)

Rapid Rotation among Pleiades K Dwarfs. *David R. Soderblom, Burton F. Jones, and Merle F. Walker*. **274**, L37, 129-C12 (1983)

Photoelectric UBV Surface Photometry of NGC 205. *Jill S. Price and Gary L. Grasdal*. **275**, 559, 143-F1 (1983)

Cepheids in Open Clusters and Associations. *J. D. Fernie and R. McGonegal*. **275**, 732, 145-E1 (1983)

Star Clusters and Stellar Evolution. I. Improved Synthetic Color-Magnitude Diagrams for the Oldest Clusters. *Don A. Vandenberg*. **51**, 29, 1-D1 (1983) (Abstr. in **263**, 1006, 142-F7)

The Star-forming History of the Young Cluster NGC 2264. *M. T. Adams, K. M. Strom, and S. E. Strom*. **53**, 893, 29-A11 (1983) (Abstr. in **274**, 920, 135-E1)

**Cluster-Type Variables: see Stars: RR Lyrae****Comets**

On Photochemical Heating of Cometary Comae: The Cases of H<sub>2</sub>O and CO-rich Comets. *W.-H. Ip*. **264**, 726, 10-C4 (1983)

Lyman-Alpha Observations of Comets West 1976 VI and P/D'Arrest 1976 XI with Copernicus. *M. C. Festou, H. U.*

*Keller, J.-L. Bertaux, and E. S. Barker*. **265**, 925, 23-A1 (1983)

Fluorescence Excitation of CO in Comets. *K. S. Krishna Swamy*. **267**, 882, 50-D4 (1983)

Dynamic Stabilization of Hydromagnetic Surface Waves: Applications to Cometary Plasma Tails. *B. Buti*. **268**, 420, 56-D11 (1983)

High-Resolution Spectra of C<sub>2</sub> Swan Bands from Comet West 1976 VI. *David L. Lambert and A. C. Danks*. **268**, 428, 56-E5 (1983)

Charge Exchange in Solar Wind-Cometary Interactions. *T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy*. **268**, 889, 62-G1 (1983)

On the Penetration of the Solar Wind into the Cometary Ionosphere. *A. I. Ershkovich and D. A. Mendis*. **269**, 743, 74-E12 (1983)

On the Microwave Emission from Comets: Erratum. *D. M. Gibson and R. W. Hobbs*. **269**, 805, 75-C4 (1983) (Orig. paper in **248**, 863, 91-A1)

An Upper Limit to the Microwave Continuum Radiation from Comet Austin (1982g). *L. E. Snyder, Patrick Palmer, and C. M. Wade*. **269**, L21, 69-B6 (1983)

The 0.9–2.5 Micron Spectrum of Comet West 1976 VI. *James R. Johnson, Uwe Fink, and Harold P. Larson*. **270**, 769, 86-D10 (1983)

Neutral Cometary Atmospheres. IV. Brightness Profiles in the Inner Coma of Comet Kahoutek 1973 XII. *A. H. Delsemme and M. R. Combi*. **271**, 388, 92-B12 (1983)

The Effect of MHD Instabilities on the Flaring of Cometary Plasma Tails. *Malcolm B. Niedner, Jr., Alexander I. Ershkovich, and John C. Brandt*. **272**, 362, 105-A3 (1983)

The Atmosphere of a Dirty-Clastrate Cometary Nucleus: A Two-Phase, Multifluid Model. *M. L. Marconi and D. A. Mendis*. **273**, 381, 116-D5 (1983)

Charge Exchange in Solar Wind-Cometary Interactions: Erratum. *T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy*. **274**, 919, 135-D14 (1983) (Orig. paper in **268**, 889, 63-A1)

The Discovery of S<sub>2</sub> in Comet Iras-Araki-Alcock 1983d. *Michael F. A'Hearn, Paul D. Feldman, and David G. Schleicher*. **274**, L99, 136-E2 (1983)

**Convection**

Observations of Global-Scale Photospheric Fraunhofer Line Shifts. *J. R. Kuhn*. **264**, 689, 9-G2 (1983)

Multiscale Model Equations for Turbulent Convection and Convective Overshoot. *Philip S. Marcus, William H. Press, and Saul A. Teukolsky*. **267**, 795, 49-D12 (1983)

Differential Rotation in F Stars: A Comparison between Theory and Observation. *G. Belvedere and L. Paternò*. **268**, 246, 54-E13 (1983)

On the Large-Scale Dynamics of Rapidly Rotating Convection Zones. *B. R. Durney*. **269**, 671, 73-F14 (1983)

A Survey of the Core Helium Flash with Dynamic Convection. *Robert G. Deupree and Peter W. Cole*. **269**, 676, 73-G5 (1983)

Lithium Abundance and Age Spread in the Pleiades. *Douglas K. Duncan and Burton F. Jones*. **271**, 663, 96-F9 (1983)

Effects of Core Perturbations on the Structure of the Sun. *Allen V. Sweigart*. **273**, 795, 122-C4 (1983)

X-Ray Emission of Late-Type Stars. *L. Paternò and F. Zuccarello*. **275**, L1, 141-F2 (1983)

Dynamically Consistent Nonlinear Dynamos Driven by Convection in a Rotating Spherical Shell. II. Dynamos with Cycles and Strong Feedbacks. *Peter A. Gilman*. **53**, 243, 20-A2 (1983) (Abstr. in **272**, 784, 110-C9)

**Cool Stars: see Stars: Late-Type****Cosmic Background Radiation**

The Extragalactic Background Light at 4400 Å. *Gary N. Toller*. **266**, L79, 39-A9 (1983)

Spherical Simulations of Holes and Honeycombs in Fried-

- mann Universes. *G. L. Hoffman, E. E. Salpeter, and I. Wasserman*. **268**, 527, 58-F13 (1983)
- Decay of Long-lived Particles in the Early Universe. *Joseph Silk and Albert Stebbins*. **269**, 1, 65-A6 (1983)
- The Irregular Distribution of Galaxies and the Anisotropies in the Microwave Background Photons. *C. Ceccarelli, F. Melchiorri, L. Pietranera, G. Dall'Oglio, and B. Melchiorri-Olivo*. **269**, L27, 76-A4 (1983)
- Superposition of Planckian Spectra and the Distortions of the Cosmic Microwave Background Radiation: Erratum. *Moorad Alexanian*. **271**, 415, 92-D11 (1983) (Orig. paper in **258**, 43, 72-E4)
- Alignment of Faint Galaxy Images: Cosmological Distortion and Rotation. *F. Valdes, J. A. Tyson, and J. F. Jarvis*. **271**, 431, 94-B5 (1983)
- A Search for the Sunyaev-Zel'dovich Effect at Millimeter Wavelengths. *S. S. Meyer, A. D. Jeffries, and R. Weiss*. **271**, L1, 93-A2 (1983)
- On the Anisotropy of the Cosmological Background Matter and Radiation Distribution. II. The Radiation Anisotropy in Models with Negative Spatial Curvature. *M. L. Wilson*. **273**, 2, 112-A7 (1983)
- Linear and Circular Polarization of the Cosmic Background Radiation. *P. Lubin, P. Melese, and G. Smoot*. **273**, L51, 123-A4 (1983)
- Galactic Absorption of High-Energy Gamma-Rays from Cygnus X-3. *Robert J. Gould*. **274**, L23, 129-B7 (1983)
- Search for Extragalactic Backgrounds in the Far-Infrared. *C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera*. **275**, L39, 148-B7 (1983)
- Cosmic Rays: Abundances**
- The Propagation of Ultraheavy Cosmic Ray Nuclei. *N. R. Brewster, P. S. Freier, and C. J. Waddington*. **264**, 324, 4-D3 (1983)
- Selective Acceleration of  $^3\text{He}$  in Solar Flare Particles by Radiation Pressure. *S. Hayakawa*. **266**, 370, 31-A2 (1983)
- Temporal Variations of Nucleonic Abundances in Solar Flare Energetic Particle Events. I. Well-connected Events. *G. M. Mason, G. Gloeckler, and D. Hovestadt*. **267**, 844, 50-A8 (1983)
- Cosmic-Ray Abundances of Sn, Te, Xe, and Ba Nuclei Measured on HEAO 3. *W. R. Binns, R. K. Fickle, T. L. Garrard, M. H. Israel, J. Klarmann, K. E. Krombel, E. C. Stone, and C. J. Waddington*. **267**, L93, 51-B12 (1983)
- Implications of HEAO 3 Data for the Acceleration and Propagation of Galactic Cosmic Rays. *J. F. Ormes and R. J. Protheroe*. **272**, 756, 110-A8 (1983)
- The Anomalous Helium Component in the Heliosphere: The 1965 versus the 1972-1977 Solar Minimum. *M. Garcia-Munoz, K. R. Pyle, and J. A. Simpson*. **274**, L93, 136-D11 (1983)
- A Measurement of the Energy Spectra and Relative Abundance of the Cosmic-Ray H and He Isotopes over a Broad Energy Range. *W. R. Webber and S. M. Yushak*. **275**, 391, 141-C1 (1983)
- Cosmic Rays: General**
- The Propagation of Ultraheavy Cosmic Ray Nuclei. *N. R. Brewster, P. S. Freier, and C. J. Waddington*. **264**, 324, 4-D3 (1983)
- Cosmic Rays from Active Galactic Nuclei and in Metagalactic Space. *M. M. Shapiro and R. Silberberg*. **265**, 570, 18-C1 (1983)
- Effects of Drift on the Transport of Cosmic Rays. VI. A Three-dimensional Model including Diffusion. *J. Kóta and J. R. Jokipii*. **265**, 573, 18-C4 (1983)
- Evidence for the Stochastic Acceleration of Cosmic Rays in Supernova Remnants. *T. W. Hartquist and G. E. Morfill*. **266**, 271, 29-G10 (1983)
- Isotopic Anomalies among Solar Energetic Particles: Contribution of Preacceleration in Collapsing Magnetic Neutral Sheets. *D. J. Mullan*. **268**, 385, 56-B2 (1983)
- Nonlinear Propagation of Hydromagnetic Waves in High-Beta Plasmas. *P. K. Shukla*. **268**, 396, 56-B13 (1983)
- Prediction of Interstellar Antiproton Flux Using a Nonuniform Galactic Disk Model. *L. C. Tan and L. K. Ng*. **269**, 751, 74-F6 (1983)
- Release of Solar Cosmic Rays from the Corona: Rayleigh-Taylor Instability and Reconnection. *D. J. Mullan*. **269**, 765, 74-G6 (1983)
- Measurements of Galactic Plane Gamma-Ray Emission in the Energy Range 10-80 MeV. *D. L. Bertsch and D. A. Kniffen*. **270**, 305, 80-C2 (1983)
- First Order and Second Order Fermi Acceleration of Energetic Charged Particles by Shock Waves. *G. M. Webb*. **270**, 319, 80-D2 (1983)
- Implications of HEAO 3 Data for the Acceleration and Propagation of Galactic Cosmic Rays. *J. F. Ormes and R. J. Protheroe*. **272**, 756, 110-A8 (1983)
- Blast Waves with Cosmic-Ray Pressure. *Roger A. Chevalier*. **272**, 765, 110-B3 (1983)
- Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gotwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills*. **274**, 231, 126-C13 (1983)
- A Quantitative Test of Solar Modulation Theory: The Proton, Helium, and Electron Spectra from 1965 through 1979. *P. Evenson, M. Garcia-Munoz, P. Meyer, K. R. Pyle, and J. A. Simpson*. **275**, L15, 141-F14 (1983)
- Cosmology**
- Effect of Variable Obscuration on the Clustering of Galaxies. *Michael Seldner and Juan M. Uson*. **264**, 1, 1-A6 (1983)
- The Ages and Compositions of Old Clusters. *Kenneth Janes and Pierre Demarque*. **264**, 206, 3-B6 (1983)
- CCD Photometry of Abell Clusters. I. Magnitudes and Redshifts for 84 Brightest Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel*. **264**, 337, 6-A5 (1983)
- Superclusters as Nondissipative Pancakes: Flattening. *Avishai Dekel*. **264**, 373, 6-D4 (1983)
- The Peculiar Velocity Field in Flattened Superclusters. *A. S. Szalay and Joseph Silk*. **264**, L31, 11-A4 (1983)
- A Distance Scale from the Infrared Magnitude/H I Velocity-Width Relation. IV. The Morphological Type Dependence and Scatter in the Relation; the Distances to Nearby Groups. *Marc Aaronson and Jeremy Mould*. **265**, 1, 12-A6 (1983)
- The Structure and Expansion Law of a Shock Wave in an Expanding Universe. *Satoru Ikeuchi, Kohji Tomisaka, and Jeremiah P. Ostriker*. **265**, 583, 19-A5 (1983)
- An Upper Limit on the Stochastic Background of Ultralow-Frequency Gravitational Waves. *R. W. Romani and J. H. Taylor*. **265**, L35, 26-A4 (1983)
- Upper Limits on the Isotropic Gravitational Radiation Background from Pulsar Timing Analysis. *R. W. Hellings and G. S. Downs*. **265**, L39, 26-A7 (1983)
- Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups, Clusters, the Hercules Supercluster, and the Value of the Hubble Constant. *R. Buta and G. de Vaucouleurs*. **266**, 1, 27-A6 (1983)
- Markarian Galaxies and Voids in the Galaxy Distribution. *Laird A. Thompson*. **266**, 446, 33-B12 (1983)
- Paired Quasars near NGC 2639: Evidence for Quasars in Superclusters? *Holland Ford, Robin Ciardullo, and Richard Harms*. **266**, 451, 33-C4 (1983)
- Is There Nonluminous Matter in Dwarf Spheroidal Galaxies? *S. M. Faber and D. N. C. Lin*. **266**, L17, 32-B3 (1983)
- Some Implications of Nonluminous Matter in Dwarf Spheroidal Galaxies. *D. N. C. Lin and S. M. Faber*. **266**, L21,

## Cosmology—Continued

- 32-B7 (1983)
- Quasar Evolution: Not a Deficit at "Low" Redshifts. *Y. Avni and N. Schiller*. **267**, 1, 40-A6 (1983)
- The Distribution of Quasars from a Small Area Survey. *Ya-ouan Chu and Xingfen Zhu*. **267**, 4, 40-A9 (1983)
- A Survey of Galaxy Redshifts. V. The Two-Point Position and Velocity Correlations. *Marc Davis and P. J. E. Peebles*. **267**, 465, 46-A5 (1983)
- A New Evaluation of the Four-Point Galaxy Correlation Function Amplitudes. *J. N. Fry*. **267**, 483, 46-B9 (1983)
- The Statistics of Gravitational Lenses: Apparent Changes in the Luminosity Function of Distant Sources Due to Passage of Light through a Single Galaxy. *Mario Vietri and Jeremiah P. Ostriker*. **267**, 488, 46-B14 (1983)
- Radioactive Models of Type I Supernovae. *Stuart R. Schurmann*. **267**, 779, 49-C10 (1983)
- Detection of 21 Centimeter Absorption at  $Z \approx 1.94$  in the QSO PKS 1157+014: Erratum. *A. M. Wolfe, F. H. Briggs, and D. L. Jauncey*. **267**, 891, 50-D13 (1983) (Orig. paper in **248**, 460, 86-F1)
- Can Graininess in the Early Universe Make Galaxies? *B. J. Carr and Joseph Silk*. **268**, 1, 52-A6 (1983)
- Cosmological Self-similar Shock Waves and Galaxy Formation. *E. Bertschinger*. **268**, 17, 52-B8 (1983)
- The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. I. The Basic Scale Factors of the Galaxy and Two Kinematic Tests of the Long and Short Distance Scales. *G. de Vaucouleurs*. **268**, 451, 58-A5 (1983)
- The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. II. Comparisons of Metric and Photometric Scale Lengths and Three Further Tests of the Long and Short Distance Scales. *G. de Vaucouleurs*. **268**, 468, 58-B8 (1983)
- CCD Photometry of Abell Clusters. II. Surface Photometry of 249 Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel*. **268**, 476, 58-C2 (1983)
- Numerical Solutions of High-Frequency Perturbations in Bianchi Type IX Models. *R. J. Slagter*. **268**, 513, 58-E13 (1983)
- Spherical Simulations of Holes and Honeycombs in Friedmann Universes. *G. L. Hoffman, E. E. Salpeter, and I. Wasserman*. **268**, 527, 58-F13 (1983)
- Physical Properties of the Intergalactic Medium and the Lyman-Alpha Absorbing Clouds. *Jeremiah P. Ostriker and Satoru Ikeuchi*. **268**, L63, 63-D9 (1983)
- Detection of  $10^{10} M_{\odot}$  of Hot Gas in the Normal Elliptical Galaxy NGC 5846 with the Einstein Satellite. *Peter Biermann and Philipp P. Kronberg*. **268**, L69, 63-E1 (1983)
- Decay of Long-lived Particles in the Early Universe. *Joseph Silk and Albert Stebbins*. **269**, 1, 65-A6 (1983)
- The Brightest Stars as Extragalactic Distance Indicators. *Roberta M. Humphreys*. **269**, 335, 70-A5 (1983)
- Quasar Evolution Derived from the Palomar Bright Quasar Survey and Other Complete Quasar Surveys. *Maarten Schmidt and Richard F. Green*. **269**, 352, 70-B9 (1983)
- The Irregular Distribution of Galaxies and the Anisotropies in the Microwave Background Photons. *C. Ceccarelli, F. Melchiorri, L. Pietranera, G. Dall'Oglio, and B. Melchiorri-Olivo*. **269**, L27, 76-A4 (1983)
- The  $V/V_{\max}$  Test for QSOs: Comments on the Paper by Hawkins and Stewart. *D. Wills*. **270**, 48, 77-D13 (1983)
- The Evolution of Voids in the Expanding Universe. *Mark A. Hausman, Donald W. Olson, and Bernard D. Roth*. **270**, 351, 82-A5 (1983)
- The Variations of Radio Luminosity with Epoch and Its Effect on the Angular Diameter-Redshift Relation. *Lesley I. Onuora and S. E. Okoye*. **270**, 360, 82-A14 (1983)
- A Modification of the Newtonian Dynamics as a Possible Alternative to the Hidden Mass Hypothesis. *M. Milgrom*. **270**, 365, 82-B5 (1983)
- Numerical Experiments on the Clustering of Galaxies. *R. H. Miller*. **270**, 390, 82-D2 (1983)
- Zero-Curvature Friedmann-Robertson-Walker Models as Exact Viscous Magnetohydrodynamic Cosmologies. *A. A. Coley and B. O. J. Tupper*. **271**, 1, 88-A6 (1983)
- Dirac's Large Numbers Hypothesis and Continuous Creation. *André Julg*. **271**, 9, 88-A14 (1983)
- Nonlinear Evolution of Large-Scale Structure in the Universe. *Carlos S. Frenk, Simon D. White, and Marc Davis*. **271**, 417, 94-A5 (1983)
- Alignment of Faint Galaxy Images: Cosmological Distortion and Rotation. *F. Valdes, J. A. Tyson, and J. F. Jarvis*. **271**, 431, 94-B5 (1983)
- Pair Correlations in an Expanding Universe for a Multicomponent System. *Henry E. Kandrup*. **272**, 1, 101-A6 (1983)
- Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups, Clusters, the Hercules Supercluster, and the Value of the Hubble Constant: Erratum. *R. Buta and G. de Vaucouleurs*. **272**, 380, 105-B7 (1983) (Orig. paper in **266**, 1, 27-A6)
- On the Anisotropy of the Cosmological Background Matter and Radiation Distribution. II. The Radiation Anisotropy in Models with Negative Spatial Curvature. *M. L. Wilson*. **273**, 2, 112-A7 (1983)
- Filamentary Galaxy Clustering: A Mapping Algorithm. *J. E. Moody, Edwin L. Turner, and J. Richard Gott III*. **273**, 16, 112-B7 (1983)
- Gravitational Instability in the Presence of a Magnetic Field in the Expanding Universe. *S. Hacyan*. **273**, 421, 118-B2 (1983)
- Planar Numerical Cosmology. I. The Differential Equations. *Joan Centrella and James R. Wilson*. **273**, 428, 118-B9 (1983)
- Constraints on Neutrino-dominated Cosmologies from Large-Scale Streaming Motion. *Nick Kaiser*. **273**, L17, 117-C4 (1983)
- The Bend in the Correlation Function: The Surviving Imprint of Adiabatic Perturbations? *Adrian L. Melott*. **273**, L21, 117-C8 (1983)
- A Cosmological Test: Its Application to Quasars and Estimates of  $q_0$ . *Ermanno F. Borra*. **273**, L55, 123-A8 (1983)
- The Sequence of Cosmogony and the Nature of Primeval Departures from Homogeneity. *P. J. E. Peebles*. **274**, 1, 124-A6 (1983)
- Cosmological Density Fluctuations and Radiation Anisotropy Generated by Pregalactic Sources of Radiation. *C. J. Hogan and N. Kaiser*. **274**, 7, 124-A12 (1983)
- A New Calibration of the Extragalactic Distance Scale Using Cepheids and RR Lyrae Stars. *Richard B. Stothers*. **274**, 20, 124-B11 (1983)
- First-ranked Galaxies in Groups. *Margaret J. Geller and Marc Postman*. **274**, 31, 124-C8 (1983)
- The Collisionless Damping of Density Fluctuations in an Expanding Universe. *J. R. Bond and A. S. Szalay*. **274**, 443, 130-A5 (1983)
- The  $V/V_{\max}$  Test in Hoyle-Narlikar Conformal Gravity. *V. K. Kulkarni and D. G. Banhatti*. **274**, 469, 130-C3 (1983)
- Clustering in a Neutrino-dominated Universe. *Simon D. M. White, Carlos S. Frenk, and Marc Davis*. **274**, L1, 129-A2 (1983)
- Alignment of Galaxies in the Coma Cluster. *S. Djorgovski*. **274**, L7, 129-A7 (1983)
- Large-Amplitude Spherically Symmetric Perturbations in the Early Universe. I. The Initial Data. *Comer Duncan*. **275**, 35, 137-C13 (1983)
- Formation of Population III Stars and Galaxies with Primordial Planetary-Mass Black Holes. *Katherine Freese, Richard Price, and David N. Schramm*. **275**, 405, 142-A5 (1983)
- Pancakes and the Formation of Galaxies in a Neutrino-dominated Universe. *Paul R. Shapiro, Curtis Struck-Marcell, and Adrian L. Melott*. **275**, 413, 142-A13 (1983)



A Global Value of the Hubble Constant. *N. Visvanathan*. **275**, 430, 142-C2 (1983)

The Most Luminous Quasar: S5 0014+81. *Helmut Kühr, James W. Liebert, Peter A. Strittmatter, Gary D. Schmidt, and Craig Mackay*. **275**, L33, 148-B1 (1983)

Star Clusters and Stellar Evolution. I. Improved Synthetic Color-Magnitude Diagrams for the Oldest Clusters. *Don A. VandenBerg*. **51**, 29, 1-D1 (1983) (Abstr. in **263**, 1006, 142-F7)

Inner Ring Structures in Galaxies as Distance Indicators. III. Distances to 453 Spiral and Lenticular Galaxies. *R. Buta and G. de Vaucouleurs*. **51**, 149, 3-A1 (1983) (Abstr. in **263**, 1005, 142-F6)

## Dense Matter

Masses, Radii, and Magnetic Fields of Pulsating X-Ray Sources: Is the "Standard" Model Self-consistent? *Ira Wasserman and Stuart L. Shapiro*. **265**, 1036, 24-B2 (1983)

Self-similar Stellar Collapse. *Amos Yahil*. **265**, 1047, 24-B13 (1983)

Amorphous Glassy Plasma in Dense Stellar Matter. *Setsuo Ichimaru, Hiroshi Iyetomi, Shinichi Mitake, and Naoki Itoh*. **265**, L83, 26-D11 (1983)

Enhancement of Thermonuclear Reaction Rate Due to Screening by Relativistic Degenerate Electrons. *Setsuo Ichimaru and Kenichi Utsumi*. **269**, L51, 76-B11 (1983)

The Effect of Trapped Lepton Number and Entropy on the Outcome of Stellar Collapse. *Adam Burrows and James M. Lattimer*. **270**, 735, 86-B3 (1983)

Structure of Neutron Star Envelopes. *E. H. Gudmundsson, C. J. Pethick, and R. I. Epstein*. **272**, 286, 104-B2 (1983)

Statistical Mechanics of Light Elements at High Pressure. V. Three-dimensional Thomas-Fermi-Dirac Theory. *J. J. MacFarlane and W. B. Hubbard*. **272**, 301, 104-C3 (1983)

Implications of the Millisecond Pulsar for Neutron Star Models. *Stuart L. Shapiro, Saul A. Teukolsky, and Ira Wasserman*. **272**, 702, 109-D10 (1983)

Collapse and Explosion of White Dwarfs. I. Precollapse Evolution. *J. Isern, J. Labay, M. Hernanz, and R. Canal*. **273**, 320, 115-F8 (1983)

Neutrino Emission from a Hot, Dense, Plane-parallel Atmosphere in Hydrostatic Equilibrium. III. The Three-flavored Atmosphere. *Paul J. Schinder and Stuart L. Shapiro*. **273**, 330, 115-G4 (1983)

Electrical and Thermal Conductivities of Dense Matter in the Liquid Metal Phase. I. High-Temperature Results. *Naoki Itoh, Shinichi Mitake, Hiroshi Iyetomi, and Setsuo Ichimaru*. **273**, 774, 122-A10 (1983)

Neutrino-Pair Bremsstrahlung in Dense Stars. I. Liquid Metal Case. *Naoki Itoh and Yasuhiro Kohyama*. **275**, 858, 147-A1 (1983)

The Quadrupole Oscillations of Neutron Stars. *Lee Lindblom and Steven L. Detweiler*. **53**, 73, 17-F7 (1983) (Abstr. in **271**, 891, 99-B13)

The Radial Oscillations of Neutron Stars. *Edward N. Glass and Lee Lindblom*. **53**, 93, 17-G13 (1983) (Abstr. in **271**, 892, 99-B14)

**Double Stars:** see **Stars: Binaries; Stars: Visual Multiples**

## Early Universe

Large-Amplitude Spherically Symmetric Perturbations in the Early Universe. I. The Initial Data. *Comer Duncan*. **275**, 35, 137-C13 (1983)

Formation of Population III Stars and Galaxies with Primordial Planetary-Mass Black Holes. *Katherine Freese, Richard Price, and David N. Schramm*. **275**, 405, 142-A5 (1983)

## Earth: Airglow

**SOLRAD II** Observations of the Far-Ultraviolet Background. *C. S. Weller*. **268**, 899, 63-A1 (1983)

**Editorials:** see **Notices**

## Elementary Particles

Equilibrium Composition and Neutrino Emissivity of Interacting Quark Matter in Neutron Stars. *Robert C. Duncan, Stuart L. Shapiro, and Ira Wasserman*. **267**, 358, 43-F12 (1983)

Decay of Long-lived Particles in the Early Universe. *Joseph Silk and Albert Stebbins*. **269**, 1, 65-A6 (1983)

Prediction of Interstellar Antiproton Flux Using a Nonuniform Galactic Disk Model. *L. C. Tan and L. K. Ng*. **269**, 751, 74-F6 (1983)

The Thermal Pair Annihilation Spectrum: A Detailed Balance Approach. *Roland Svensson*. **270**, 300, 80-B11 (1983)

Bulk Viscosity of Degenerate Neutrinos. *Ch. G. van Weert and L. J. van den Horn*. **270**, 315, 80-C12 (1983)

Neutrino Emission from a Hot, Dense, Plane-parallel Atmosphere in Hydrostatic Equilibrium. III. The Three-flavored Atmosphere. *Paul J. Schinder and Stuart L. Shapiro*. **273**, 330, 115-G4 (1983)

Pair Production in Superstrong Magnetic Fields. *Joseph K. Daugherty and Alice K. Harding*. **273**, 761, 121-G11 (1983)

The Collisionless Damping of Density Fluctuations in an Expanding Universe. *J. R. Bond and A. S. Szalay*. **274**, 443, 130-A5 (1983)

## Equation of State

Masses, Radii, and Magnetic Fields of Pulsating X-Ray Sources: Is the "Standard" Model Self-consistent? *Ira Wasserman and Stuart L. Shapiro*. **265**, 1036, 24-B2 (1983)

Statistical Mechanics of Light Elements at High Pressure. V. Three-dimensional Thomas-Fermi-Dirac Theory. *J. J. MacFarlane and W. B. Hubbard*. **272**, 301, 104-C3 (1983)

Implications of the Millisecond Pulsar for Neutron Star Models. *Stuart L. Shapiro, Saul A. Teukolsky, and Ira Wasserman*. **272**, 702, 109-D10 (1983)

The Quadrupole Oscillations of Neutron Stars. *Lee Lindblom and Steven L. Detweiler*. **53**, 73, 17-F7 (1983) (Abstr. in **271**, 891, 99-B13)

The Radial Oscillations of Neutron Stars. *Edward N. Glass and Lee Lindblom*. **53**, 93, 17-G13 (1983) (Abstr. in **271**, 892, 99-B14)

**Equations:** see **Functions: Numerical Methods**

## Errata and Addenda

A Multiwavelength Comparison of Cassiopeia A and Tycho's Supernova Remnant: Erratum. *John R. Dickel, Stephen S. Murray, Jeffrey Morris, and Donald C. Wells*. **264**, 746, 10-D10 (1983) (Orig. paper in **257**, 145, 62-E6)

The Thermonuclear Model for X-Ray Transients: Erratum. *R. K. Wallace, S. E. Woosley, and Thomas A. Weaver*. **264**, 746, 10-D10 (1983) (Orig. paper in **258**, 696, 81-A1)

IUE Observations of Gas Stream Effects in the Ultraviolet Spectrum of U Cephei: Erratum. *Yoji Kondo, George E. McCluskey, and Robert E. Stencel*. **264**, 746, 10-D10 (1983) (Orig. paper in **233**, 906, 103-D11)

Theoretical Oscillator Strengths for 21 Spin-forbidden Lines of C, N, O, Al, and Si: Erratum. *Robert D. Cowan, L. M. Hobbs, and D. G. York*. **265**, 582, 18-C13 (1983) (Orig. paper in **257**, 373, 65-A7)

On the Microwave Emission from Comets: Erratum. *D. M. Gibson and R. W. Hobbs*. **269**, 805, 75-C4 (1983) (Orig. paper in **248**, 863, 91-A1)

Observations of Two Gamma-Ray Bursts by Vela X-Ray Detectors: Erratum. *J. Terrell, E. E. Fenimore, R. W. Klebesadel, and U. D. Desai*. **269**, 806, 75-C5 (1983) (Orig. paper in **254**, 279, 29-A12)

Detection of Auroral Hydrogen Lyman-Alpha Emission from Uranus: Erratum. *John T. Clarke*. **269**, L25, 69-B9 (1983) (Orig. paper in **263**, L105, 143-E8)

Collisional Rates for Vibrational-Rotational Transitions in Circumstellar SiO Masers: Erratum. *R. J. Bienenek and S. Green*.

**Errata and Addenda—Continued**

- 270**, L101, 87-F9 (1983) (Orig. paper in **265**, L29, 18-F12)  
 Superposition of Planckian Spectra and the Distortions of the Cosmic Microwave Background Radiation: Erratum. *Moorad Alexanian*. **271**, 415, 92-D11 (1983) (Orig. paper in **258**, 43, 72-E4)  
 Second-Order Escape Probability Approximations in Radiative Transfer: Erratum. *D. G. Hummer and George B. Rybicki*. **271**, 888, 99-B10 (1983) (Orig. paper in **263**, 925, 141-G7)  
 Density of Quasars around Companion Galaxies: Addendum. *Halton Arp*. **271**, L41, 93-D2 (1983) (Orig. paper in **263**, L9, 136-D9)  
 Why High-Latitude Clouds in Our Galaxy and the Highly Redshifted Clouds Observed in Front of QSOs Do Not Belong to the Same Parent Population: Erratum. *A. M. Wolfe*. **271**, L43, 93-D3 (1983) (Orig. paper in **268**, L1, 57-A3)  
 Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups. Clusters, the Hercules Supercluster, and the Value of the Hubble Constant: Erratum. *R. Buta and G. de Vaucouleurs*. **272**, 380, 105-B7 (1983) (Orig. paper in **266**, 1, 27-A6)  
 HEAO 1 Observations of Quiescent X-Ray Emission from Flare Stars: Erratum. *Vassiliki Tsikoudi*. **272**, 381, 105-B8 (1983) (Orig. paper in **262**, 263, 124-A1)  
 The Chemical Inhomogeneity of M22: Erratum. *John Norris and K. C. Freeman*. **273**, 837, 122-F6 (1983) (Orig. paper in **266**, 130, 28-D5)  
 Quasar Evolution and Gravitational Collapse: Erratum. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti*. **273**, 837, 122-F6 (1983) (Orig. paper in **269**, 57, 65-E10)  
 Charge Exchange in Solar Wind-Cometary Interactions: Erratum. *T. I. Gombosi, M. Horanyi, K. Kecskemeti, T. E. Cravens, and A. F. Nagy*. **274**, 919, 135-D14 (1983) (Orig. paper in **268**, 889, 63-A1)  
 A Giant X-Ray Flare in the Hyades: Erratum. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos*. **275**, L25, 141-G9 (1983) (Orig. paper in **264**, L55, 11-B11)  
 Color-Magnitude Studies of Globular Clusters. I. The Bright Stars in NGC 362: Erratum. *William E. Harris*. **51**, 269, 5-C1 (1983) (Orig. paper in **50**, 573, 31-D1)  
 5 GHz Observations of Sources in the Arecibo 611 MHz Survey: Erratum. *C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke*. **52**, 182, 11-G4 (1983) (Orig. paper in **51**, 67, 2-A1)  
 Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, and Belva G. Campbell*. **53**, 241, 19-D4 (1983) (Orig. paper in **51**, 309, 6-F1)
- Excitation and Ionization:** see **Atomic Processes**
- Forbidden Lines:** see **Atomic Processes**
- f-Values:** see **Transition Probabilities**
- Galaxies: Clustering**  
 Effect of Variable Obscuration on the Clustering of Galaxies. *Michael Seldner and Juan M. Uson*. **264**, 1, 1-A6 (1983)  
 Observational Constraints on Galaxy-IGM Interactions in the Virgo Cluster. *John R. Stauffer*. **264**, 14, 1-B5 (1983)  
 Relaxation and Tidal Stripping in Rich Clusters of Galaxies. I. Evolution of the Mass Distribution. *David Merritt*. **264**, 24, 1-C1 (1983)  
 Carbon Stars in Local Group Galaxies. *Harvey B. Richer and Bengt E. Westerlund*. **264**, 114, 2-B10 (1983)  
 CCD Photometry of Abell Clusters. I. Magnitudes and Redshifts for 84 Brightest Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel*. **264**, 337, 6-A5 (1983)  
 Galaxy Clusters with Multiple Components. II. Abell 115. *Timothy C. Beers, John P. Huchra, and Margaret J. Geller*. **264**, 356, 6-B12 (1983)  
 Numerical Simulations of the Decay of Satellite Galaxy Orbits. *D. N. C. Lin and Scott Tremaine*. **264**, 364, 6-C9 (1983)  
 Superclusters as Nondissipative Pancakes: Flattening. *Avishai Dekel*. **264**, 373, 6-D4 (1983)  
 The Peculiar Velocity Field in Flattened Superclusters. *A. S. Szalay and Joseph Silk*. **264**, L31, 11-A4 (1983)  
 A Distance Scale from the Infrared Magnitude/H I Velocity-Width Relation. IV. The Morphological Type Dependence and Scatter in the Relation; the Distances to Nearby Groups. *Marc Aaronson and Jeremy Mould*. **265**, 1, 12-A6 (1983)  
 The X-Ray Morphology of Abell 1367. *J. Bechtold, W. Forman, R. Giacconi, C. Jones, J. Schwarz, W. Tucker, and L. Van Speybroeck*. **265**, 26, 12-C7 (1983)  
 Cosmic Rays from Active Galactic Nuclei and in Metagalactic Space. *M. M. Shapiro and R. Silberberg*. **265**, 570, 18-C1 (1983)  
 Hierarchical Merging and the Structure of Elliptical Galaxies. *Rida T. Farouki, Stuart L. Shapiro, and Martin J. Duncan*. **265**, 597, 19-B5 (1983)  
 The Nature of the Cluster Surrounding 3C 295. *Sidney van den Bergh*. **265**, 606, 19-B14 (1983)  
 Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups. Clusters, the Hercules Supercluster, and the Value of the Hubble Constant. *R. Buta and G. de Vaucouleurs*. **266**, 1, 27-A6 (1983)  
 A Survey by HEAO 1 of Clusters of Galaxies. III. The Complete Abell Catalog. *M. W. Johnson, R. G. Cruddace, M. P. Ulmer, M. P. Kowalski, and K. S. Wood*. **266**, 425, 33-A5 (1983)  
 Markarian Galaxies and Voids in the Galaxy Distribution. *Laird A. Thompson*. **266**, 446, 33-B12 (1983)  
 Paired Quasars near NGC 2639: Evidence for Quasars in Superclusters? *Holland Ford, Robin Ciardullo, and Richard Harms*. **266**, 451, 33-C4 (1983)  
 Normal Modes of Relaxation in Stellar Systems: Dynamical Friction and Thermalization. *David Layzer*. **266**, 831, 37-D8 (1983)  
 Flocculent and Grand Design Spiral Galaxies in Groups: Time Scales for the Persistence of Grand Design Spiral Structures. *Bruce G. Elmegreen and Debra Meloy Elmegreen*. **267**, 31, 40-C8 (1983)  
 Effects of Environment on Neutral Hydrogen Distribution for Disk Galaxies in the Virgo Cluster Area. *C. Giovanardi, George Helou, E. E. Salpeter, and Nathan Krumm*. **267**, 35, 40-C13 (1983)  
 A Survey of Galaxy Redshifts. V. The Two-Point Position and Velocity Correlations. *Marc Davis and P. J. E. Peebles*. **267**, 465, 46-A5 (1983)  
 A New Evaluation of the Four-Point Galaxy Correlation Function Amplitudes. *J. N. Fry*. **267**, 483, 46-B9 (1983)  
 Neutral Hydrogen in X-Ray Cluster Galaxies: A1367. *Guido L. Chincarini, R. Giovanelli, M. Haynes, and P. Fontanelli*. **267**, 511, 46-D9 (1983)  
 Cosmological Self-similar Shock Waves and Galaxy Formation. *E. Bertschinger*. **268**, 17, 52-B8 (1983)  
 The Evolution of Clusters of Galaxies. I. Very Rich Clusters. *Douglas O. Richstone and Eliot M. Malumuth*. **268**, 30, 52-C7 (1983)  
 The Cancer Cluster: An Unbound Collection of Groups. *Gregory D. Bothun, Margaret J. Geller, Timothy C. Beers, and John P. Huchra*. **268**, 47, 52-D10 (1983)  
 Redshift Quantization in Compact Groups of Galaxies. *W. J. Cocke and W. G. Tifft*. **268**, 56, 52-E5 (1983)  
 The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. I. The Basic Scale Factors of the Galaxy and Two Kinematic Tests of the Long and Short Distance Scales. *G. de Vaucouleurs*. **268**, 451, 58-A5 (1983)  
 CCD Photometry of Abell Clusters. II. Surface Photometry of 249 Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel*. **268**, 476, 58-C2 (1983)

- Effects of Galaxy Collisions on the Structure and Evolution of Galaxy Clusters. I. Mass and Luminosity Functions and Background Light. *Glenn E. Miller*. **268**, 495, 58-D9 (1983)
- Spherical Simulations of Holes and Honeycombs in Friedmann Universes. *G. L. Hoffman, E. E. Salpeter, and I. Wasserman*. **268**, 527, 58-F13 (1983)
- Redshift Modifications to HEAO A-1 Cluster X-Ray Luminosities. *M. P. Kowalski, M. P. Ulmer, and R. G. Cruddace*. **268**, 540, 59-A1 (1983)
- Accretion-driven Star Formation in Central Dominant Galaxies in X-Ray Clusters. *Craig L. Sarazin and Robert W. O'Connell*. **268**, 552, 59-B2 (1983)
- A Note on the Formation of Clusters of Galaxies. *Paul S. Wesson*. **268**, 561, 59-B11 (1983)
- 21 Centimeter Observations of Supercluster Galaxies: The Bridge between Coma and A1367. *Guido L. Chincarini, Riccardo Giovanelli, and Martha P. Haynes*. **269**, 13, 65-B4 (1983)
- On the Association of Galaxies and QSOs. *Howard B. French and James E. Gunn*. **269**, 29, 65-C10 (1983)
- Spectroscopy of Galaxies in Distant Clusters. II. The Population of the 3C 295 Cluster. *Alan Dressler and James E. Gunn*. **270**, 7, 77-A12 (1983)
- The Spatial Correlation Function of Rich Clusters of Galaxies. *Neta A. Bahcall and Raymond M. Soneira*. **270**, 20, 77-B13 (1983)
- Discovery of a Quasar with a Wide Angle Radio Tail in a Distant Cluster of Galaxies. *D. E. Harris, P. E. Dewdney, C. H. Costain, H. Butcher, and A. G. Willis*. **270**, 39, 77-D4 (1983)
- A Modification of the Newtonian Dynamics: Implications for Galaxy Systems. *M. Milgrom*. **270**, 384, 82-C10 (1983)
- Numerical Experiments on the Clustering of Galaxies. *R. H. Miller*. **270**, 390, 82-D2 (1983)
- Radio and X-Ray Observations of the Radio Halo Source in A1367. *G. Gavazzi and G. Trinchieri*. **270**, 410, 82-E12 (1983)
- On the Density of Galaxy Quartets and the Statistical Likelihood of Discordant Redshift Groups. *Jack W. Sulentic*. **270**, 417, 82-F5 (1983)
- On the Mass and Extent of the Coma Cluster of Galaxies. *Haywood Smith, Jr.* **270**, 422, 82-F10 (1983)
- Correlation Functions in a Filamentary Clustering Prescription. *J. N. Fry*. **270**, L31, 87-A4 (1983)
- The Collapse and Violent Relaxation of N-Body Systems: Mass Segregation and the Secondary Maximum. *R. T. Farkouk, G. L. Hoffman, and E. E. Salpeter*. **271**, 11, 88-B2 (1983)
- The X-Ray Luminosity Function of Very Rich Clusters and the Luminosity-Richness Relation. *Andrzej Soltan and J. Patrick Henry*. **271**, 442, 94-C2 (1983)
- X-Ray Survey of Clusters of Galaxies with the Einstein Observatory. *Frank Abramopoulos and William H.-M. Ku*. **271**, 446, 94-C6 (1983)
- The IC 698 Group of Galaxies. *B. A. Williams*. **271**, 461, 94-D7 (1983)
- CCD Photometry of the BL Lacertae Object 1400+162 and the Associated Group of Galaxies. *Donna Weistrop, David B. Shaffer, Harold J. Reitsema, and Bradford A. Smith*. **271**, 471, 94-E11 (1983)
- Further Observations and Analysis of Quasars Near Companion Galaxies. *Halton Arp*. **271**, 479, 94-F5 (1983)
- A 10 Micron Survey of Star Formation in Galactic Nuclei: Virgo Spiral Galaxies. *N. Z. Scoville, E. E. Becklin, Judith S. Young, and R. W. Capps*. **271**, 512, 95-B3 (1983)
- Pair Correlations in an Expanding Universe for a Multicomponent System. *Henry E. Kandrup*. **272**, 1, 101-A6 (1983)
- Two-dimensional Spectrophotometry of the Cores of X-Ray Luminous Clusters. *L. L. Cowie, E. M. Hu, E. B. Jenkins, and D. G. York*. **272**, 29, 101-C6 (1983)
- Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups, Clusters, the Hercules Supercluster, and the Value of the Hubble Constant: Erratum. *R. Buta and G. de Vaucouleurs*. **272**, 380, 105-B7 (1983) (Orig. paper in **266**, 1, 27-A6)
- X-Ray, Optical, and Radio Observations of the Blue Galaxy Butcher-Oemler 6 in the 3C 295 Cluster. *J. Patrick Henry, John T. Clarke, Stuart Bowyer, and Russell J. Lavery*. **272**, 434, 106-D14 (1983)
- The X-Ray Emitting Gas in Poor Clusters with Central Dominant Galaxies. *Gerard A. Kriss, Denis F. Cioffi, and Claude R. Canizares*. **272**, 439, 106-E7 (1983)
- Radiative Accretion of Intracuster Gas onto Dominant Galaxies in Poor Clusters. *Claude R. Canizares, Gordon C. Stewart, and Andrew C. Fabian*. **272**, 449, 106-F6 (1983)
- Globular Cluster Systems in the Hydra I Elliptical Galaxies. II. *William E. Harris, Malcolm G. Smith, and Eric S. Myra*. **272**, 456, 106-F13 (1983)
- Filamentary Galaxy Clustering: A Mapping Algorithm. *J. E. Moody, Edwin L. Turner, and J. Richard Gott III*. **273**, 16, 112-B7 (1983)
- Redshifts of Groups and Clusters in the Rich Superclusters 1451+22 and 1615+43. *Robin Ciardullo, Holland Ford, Frank Bartko, and Richard Harms*. **273**, 24, 112-C10 (1983)
- The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. *John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Maccacaro, I. J. Danziger, D. Kunth, and J. Lub*. **273**, 458, 118-D12 (1983)
- Wolf-Rayet Stars in the Local Group Galaxies M31 and NGC 6822. *Anthony F. J. Moffat and Michael M. Shara*. **273**, 544, 119-E3 (1983)
- Einstein Observations of NGC 4438: Dynamical Ablation of Gas in the Virgo Cluster. *C. Kotanyi, J. H. van Gorkom, and R. D. Ekers*. **273**, L7, 117-B7 (1983)
- The Bend in the Correlation Function: The Surviving Imprint of Adiabatic Perturbations? *Adrian L. Melott*. **273**, L21, 117-C8 (1983)
- First-ranked Galaxies in Groups. *Margaret J. Geller and Marc Postman*. **274**, 31, 124-C8 (1983)
- Luminosity Distributions for Virgo Cluster Galaxies. I. Near-Infrared Surface Photometry of 81 Disk Systems. *Todd A. Boroson, Karen M. Strom, and Stephen E. Strom*. **274**, 39, 124-D2 (1983)
- Simulations of Sinking Satellites. *Simon D. M. White*. **274**, 53, 124-E2 (1983)
- Nonlinear Evolution of Superclusters. *A. R. Rivolo and A. Yahil*. **274**, 474, 130-C8 (1983)
- The Environment of D and cD Galaxies. *Timothy C. Beers and Margaret J. Geller*. **274**, 491, 130-D11 (1983)
- Brightest Members of Rich and Poor Clusters of Galaxies. I. Surface Brightness Profiles of cD Type Galaxies. *Christopher Morbey and Stephen Morris*. **274**, 502, 130-E9 (1983)
- The Intrinsic Shape of cD Galaxies. *Christ Ftaclas and Mitchell F. Struble*. **274**, 521, 130-F14 (1983)
- The Clustering of Galaxies in a Complete Redshift Survey. *T. Shanks, A. J. Bean, G. Efsthathiou, R. S. Ellis, R. Fong, and B. A. Peterson*. **274**, 529, 130-G8 (1983)
- Galaxy Content of Selected Southern Groups: Elliptical Galaxies at Low Density. *Allan Wirth*. **274**, 541, 131-B3 (1983)
- Clustering in a Neutrino-dominated Universe. *Simon D. M. White, Carlos S. Frenk, and Marc Davis*. **274**, L1, 129-A2 (1983)
- Alignment of Galaxies in the Coma Cluster. *S. Djorgovski*. **274**, L7, 129-A7 (1983)
- Diameter versus Surface Brightness Diagram of Galaxies. *K. Kodaira, S. Okamura, and M. Watanabe*. **274**, L49, 136-A4 (1983)
- Einstein X-Ray Observations of Optical-Radio Selected Areas. *P. Katgert, Trinh X. Thuan, and Rogier A. Windhorst*. **275**, 1, 137-A6 (1983)

**Galaxies: Clustering—Continued**

- A Global Value of the Hubble Constant. *N. Visvanathan*. **275**, 430, 142-C2 (1983)
- Neutral Hydrogen in Isolated Galaxies. III. The Redshift Distribution. *Martha P. Haynes and Riccardo Giovanelli*. **275**, 472, 142-F3 (1983)
- The Filaments of NGC 1275: A Collision between a Galaxy and an Accretion Flow? *E. M. Hu, L. L. Cowie, P. Kaaret, E. B. Jenkins, D. G. York, and F. L. Roesler*. **275**, L27, 148-A4 (1983)
- A Catalog of Hierarchical Subclustering in the Turner-Gott Groups. *Suketu P. Bhavsar and Richard G. Piggott, Jr.* **52**, 23, 9-C10 (1983) (Abstr. in **267**, 893, 50-E1)
- Groups of Galaxies. III. The CfA Survey. *M. J. Geller and J. P. Huchra*. **52**, 61, 10-A2 (1983) (Abstr. in **268**, 906, 63-A9)
- The Evolution of Galaxies in Clusters. III. Photometry of 17 Intermediate Redshift Clusters. *Harvey Butcher, Augustus Oemler, and Donald C. Wells*. **52**, 183, 12-A2 (1983) (Abstr. in **269**, 809, 75-C8)
- A Catalog of Dwarf-Galaxies in Virgo. *Gibson Reaves*. **53**, 375, 21-F12 (1983) (Abstr. in **272**, 786, 110-C11)

**Galaxies: Evolution**

- Relaxation and Tidal Stripping in Rich Clusters of Galaxies. I. Evolution of the Mass Distribution. *David Merritt*. **264**, 24, 1-C1 (1983)
- Time Evolution of Disk Galaxies Undergoing Stochastic Self-propagating Star Formation. *Wendy L. Freedman and Barry F. Madore*. **265**, 140, 13-E11 (1983)
- The Effects of Induced Star Formation on the Evolution of the Galaxy. II. The Galactic Ecosystem. *Steven N. Shore*. **265**, 202, 14-C14 (1983)
- The  $L \propto \sigma^4$  Relation for the Bulge Components of Disk Galaxies. *John Kormendy and Garth Illingworth*. **265**, 632, 19-D13 (1983)
- The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger*. **266**, L73, 39-A4 (1983)
- Orbital Configurations for Gas in Elliptical Galaxies. *David Merritt and Tim de Zeeuw*. **267**, L19, 45-C9 (1983)
- The Evolution of Clusters of Galaxies. I. Very Rich Clusters. *Douglas O. Richstone and Eliot M. Malumuth*. **268**, 30, 52-C7 (1983)
- The Ages of the Disks of S0 Galaxies. *Nelson Caldwell*. **268**, 90, 52-G11 (1983)
- Effects of Galaxy Collisions on the Structure and Evolution of Galaxy Clusters. I. Mass and Luminosity Functions and Background Light. *Glenn E. Miller*. **268**, 495, 58-D9 (1983)
- Detection of  $10^{10} M_{\odot}$  of Hot Gas in the Normal Elliptical Galaxy NGC 5846 with the Einstein Satellite. *Peter Biermann and Philipp P. Kronberg*. **268**, L69, 63-E1 (1983)
- Dwarf Elliptical Galaxies. *Humberto Gerola, Paolo Carnevali, and E. E. Salpeter*. **268**, L75, 63-E6 (1983)
- Simulation Models for the Evolution of Cloud Systems. I. Introduction and Preliminary Simulations. *William A. Pumphrey and John M. Scalzo*. **269**, 531, 72-C4 (1983)
- Nonlinear Evolution of Large-Scale Structure in the Universe. *Carlos S. Frenk, Simon D. White, and Marc Davis*. **271**, 417, 94-A5 (1983)
- Pair Correlations in an Expanding Universe for a Multicomponent System. *Henry E. Kandrup*. **272**, 1, 101-A6 (1983)
- The Rate of Star Formation in Normal Disk Galaxies. *Robert C. Kennicutt, Jr.* **272**, 54, 101-E13 (1983)
- Luminosity Function of High-Redshift Quasars. *Barbara Gaston*. **272**, 411, 106-C5 (1983)
- Shell Structure in NGC 5128. *D. F. Malin, P. J. Quinn, and J. A. Graham*. **272**, L5, 105-D6 (1983)
- Spectrophotometry of 12 Metal-poor Galaxies: Implications

- for the Primordial Helium Abundance. *Daniel Kunth and Wallace L. W. Sargent*. **273**, 81, 113-A7 (1983)
- Spectral Evolution of Galaxies. I. Early-Type Systems. *Gustavo Bruzual A.* **273**, 105, 113-C6 (1983)
- A Catalog of Elliptical Galaxies with Shells. *D. F. Malin and D. Carter*. **274**, 534, 131-A1 (1983)
- Stellar Evolution in N-Body Simulations of Disk Galaxies. I. *Neil F. Comins*. **274**, 595, 132-A1 (1983)
- The Vertical Growth and Structure of Galactic Disks. *Jens Verner Villumsen*. **274**, 632, 132-C11 (1983)
- Spectral Evolution of Galaxies. III. Cosmological Predictions for the Space Telescope Faint Object Camera. *Gustavo Bruzual A.* **53**, 497, 23-E2 (1983) (Abstr. in **272**, 787, 110-C12)

**Galaxies: Formation**

- Superclusters as Nondissipative Pancakes: Flattening. *Avishai Dekel*. **264**, 373, 6-D4 (1983)
- A Simple Theory of How Spiral Galaxies Acquire Their Principal Global Properties. *David Burstein and Craig L. Sarazin*. **264**, 427, 7-A6 (1983)
- Self-regulating Star Formation: The Rate Limit Set by Ionizing Photons. *Donald P. Cox*. **265**, L61, 26-C4 (1983)
- The Kinematic Properties of Faint Elliptical Galaxies. *Roger L. Davies, George Efsthathiou, S. Michael Fall, Garth Illingworth, and Paul L. Schechter*. **266**, 41, 27-D4 (1983)
- Some Implications of Nonluminous Matter in Dwarf Spheroidal Galaxies. *D. N. C. Lin and S. M. Faber*. **266**, L21, 32-B7 (1983)
- Flocculent and Grand Design Spiral Galaxies in Groups: Time Scales for the Persistence of Grand Design Spiral Structures. *Bruce G. Elmegreen and Debra Meloy Elmegreen*. **267**, 31, 40-C8 (1983)
- Can Graininess in the Early Universe Make Galaxies? *B. J. Carr and Joseph Silk*. **268**, 1, 52-A6 (1983)
- Cosmological Self-similar Shock Waves and Galaxy Formation. *E. Bertschinger*. **268**, 17, 52-B8 (1983)
- A Note on the Formation of Clusters of Galaxies. *Paul S. Wesson*. **268**, 561, 59-B11 (1983)
- The Bend in the Correlation Function: The Surviving Imprint of Adiabatic Perturbations? *Adrian L. Melott*. **273**, L21, 117-C8 (1983)
- The Sequence of Cosmogony and the Nature of Primeval Departures from Homogeneity. *P. J. E. Peebles*. **274**, 1, 124-A6 (1983)
- Cosmological Density Fluctuations and Radiation Anisotropy Generated by Pregalactic Sources of Radiation. *C. J. Hogan and N. Kaiser*. **274**, 7, 124-A12 (1983)
- The Dynamic and Gravitational Instabilities of Spherical Shocks. *Ethan T. Vishniac*. **274**, 152, 125-E4 (1983)
- A Catalog of Elliptical Galaxies with Shells. *D. F. Malin and D. Carter*. **274**, 534, 131-A1 (1983)
- Alignment of Galaxies in the Coma Cluster. *S. Djorgovski*. **274**, L7, 129-A7 (1983)
- Formation of Population III Stars and Galaxies with Primordial Planetary-Mass Black Holes. *Katherine Freese, Richard Price, and David N. Schramm*. **275**, 405, 142-A5 (1983)
- Pancakes and the Formation of Galaxies in a Neutrino-dominated Universe. *Paul R. Shapiro, Curtis Struck-Marcell, and Adrian L. Melott*. **275**, 413, 142-A13 (1983)

**Galaxies: General**

- The Absence of Rapid X-Ray Variability in Active Galaxies. *Allyn F. Tennant and R. F. Mushotzky*. **264**, 92, 2-A1 (1983)
- X-Ray Observations of the Antennae (NGC 4038/39). *G. Fabiano and G. Trinchieri*. **266**, L5, 32-A5 (1983)
- Accurate Radial Velocities for Carbon Stars in Draco and Ursa Minor: The First Hint of a Dwarf Spheroidal Mass-to-Light Ratio. *Marc Aaronson*. **266**, L11, 32-A12 (1983)
- NGC 3105: High-Velocity H I in an Active Elliptical Galaxy? *L. L. Dressler, T. M. Bania, and M. M. Davis*. **266**, L97, 39-B12 (1983)



- The Variation of Dust Temperatures in Maffei 2. L. J. Rickard and P. M. Harvey. **268**, L7, 57-A8 (1983)
- Neutral Hydrogen Absorption in the Quasar 3C 268.4: Possible Evidence for Galactic Halo Clouds. Aubrey D. Haschick, Patrick C. Crane, and Willem A. Baan. **269**, L43, 76-B3 (1983)
- Density of Quasars around Companion Galaxies: Addendum. Halton Arp. **271**, L41, 93-D2 (1983) (Orig. paper in **263**, L9, 136-D9)
- Alignment of Galaxies in the Coma Cluster. S. Djorgovski. **274**, L7, 129-A7 (1983)
- Inner Ring Structures in Galaxies as Distance Indicators. III. Distances to 453 Spiral and Lenticular Galaxies. R. Buta and G. de Vaucouleurs. **51**, 149, 3-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- Galaxies: Individual** (arranged by Messier number, NGC number, and by Other Designation)
- By Messier Number*
- Gravitationally Induced Spurs in Spiral Galaxies: An Example in M31. Gene G. Byrd. **264**, 464, 7-D4 (1983)
- The Supernova near the Nuclei of M31 and the Galaxy. Sidney van den Bergh. **265**, 719, 20-E9 (1983)
- CCD Photometry of the Center of M31. Stephen M. Kent. **266**, 562, 34-D5 (1983)
- Dynamics of the Stellar Component of the Bulge of M31. Douglas B. McElroy. **270**, 485, 83-D12 (1983)
- H $\alpha$  Observations of Four Novae in M31. Robin Ciardullo, Holland Ford, and George Jacoby. **272**, 92, 102-A11 (1983)
- Wolf-Rayet Stars in the Local Group Galaxies M31 and NGC 6822. Anthony F. J. Moffat and Michael M. Shara. **273**, 544, 119-E3 (1983)
- Velocity Dispersion of Planetary Nebulae in the Nuclear Bulge of M31. David G. Lawrie. **273**, 562, 119-F8 (1983)
- Star Formation in the Semistellar Nucleus of M33. Robert W. O'Connell. **267**, 80, 40-G7 (1983)
- The Distance to M33 Based on a New Study of Its Cepheids. Allan Sandage and George Carlson. **267**, L25, 45-C14 (1983)
- Wolf-Rayet Stars in M33. Philip Massey and Peter S. Conti. **273**, 576, 119-G8 (1983)
- H II Regions and Star Formation in M83 and M33. K. S. Rumstay and Michele Kaufman. **274**, 611, 132-B3 (1983)
- Spectrophotometry of M33 Clusters. C. A. Christian and R. A. Schommer. **275**, 92, 138-A11 (1983)
- X-Ray Observations of M33 with the High Resolution Imager on the Einstein Observatory. Thomas H. Markert and Andrew D. Rallis. **275**, 571, 143-F14 (1983)
- IUE Observations of the Exciting Stars of Giant H II Regions in M33: Supermassive Stars? Philip Massey and J. B. Hutchings. **275**, 578, 143-G9 (1983)
- The Molecular Gas Distribution in M51. Nick Scoville and Judith S. Young. **265**, 148, 13-F5 (1983)
- Optical Spectrophotometry of the Nuclear Region of M51. II. Further Evidence for Nuclear Activity. James A. Rose and Gerald Cecil. **266**, 531, 34-B2 (1983)
- The H I Distribution in an Extremely Faint Dwarf Irregular Galaxy M81 dW. W. L. W. Sargent, R. Sancisi, and K. Y. Lo. **265**, 711, 20-D14 (1983)
- The Distribution of the CO J = 2-1 Emission from M82. E. C. Sutton, C. R. Masson, and T. G. Phillips. **275**, L49, 148-C2 (1983)
- [M83] The Probable Association of SN 1957d in NGC 5236 (M83) with an Unresolved Radio Source. Robert L. Pennington and Reginald J. Dufour. **270**, L7, 81-A8 (1983)
- H II Regions and Star Formation in M83 and M33. K. S. Rumstay and Michele Kaufman. **274**, 611, 132-B3 (1983)
- Images in the Rocket Ultraviolet: The Starburst in the Nucleus of M83. R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, and T. P. Stecher. **274**, L53, 136-A8 (1983)
- Infrared Observations of the Jet in M87. R. M. Smith, G. V. Bicknell, A. R. Hyland, and T. J. Jones. **266**, 69, 27-F4 (1983)
- Further Evidence for M87's Massive, Dark Halo. D. Fabricant and P. Gorenstein. **267**, 535, 46-F5 (1983)
- Thermal Conduction and Heating by Nonthermal Electrons in the X-Ray Halo of M87. Wallace H. Tucker and Robert Rosner. **267**, 547, 46-G3 (1983)
- M Supergiants and the Distance to M101. R. M. Humphreys and S. E. Strom. **264**, 458, 7-C9 (1983)
- CO Emission and the Optical Disk in the Giant Sc Galaxy M101. P. M. Solomon, J. Barrett, D. B. Sanders, and R. de Zafra. **266**, L103, 39-C3 (1983)
- By NGC Number*
- A Search for Globular Clusters around the Edge-on Spiral Galaxy NGC 55. William Liller and Gonzalo Alcaïno. **264**, 53, 1-E2 (1983)
- Stellar Populations in Local Group Dwarf Elliptical Galaxies. I. NGC 147. J. R. Mould, Jerome Kristian, and G. S. Da Costa. **270**, 471, 83-C10 (1983)
- VLA Observations of the Neutral Hydrogen Content of NGC 185 and NGC 205. Douglas W. Johnson and S. T. Gottesman. **275**, 549, 143-D14 (1983)
- VLA Observations of the Neutral Hydrogen Content of NGC 185 and NGC 205. Douglas W. Johnson and S. T. Gottesman. **275**, 549, 143-D14 (1983)
- Photoelectric UVB Surface Photometry of NGC 205. Jill S. Price and Gary L. Grasdale. **275**, 559, 143-F1 (1983)
- A Search for Globular Clusters around the Edge-on Late-Type Spiral Galaxy NGC 253. William Liller and Gonzalo Alcaïno. **265**, 166, 13-G9 (1983)
- [NGC 315] Pressure Collimation of Supersonic Radio Jets. Arno Krautter, R. N. Henriksen, and Kayll Lake. **269**, 81, 65-G6 (1983)
- The Noninteracting Spiral Pair, NGC 450/UGC 807. Vera C. Rubin and W. Kent Ford, Jr. **271**, 556, 95-E5 (1983)
- The Ratio of the Unseen Halo Mass to the Luminous Disk Mass in NGC 891. John N. Bahcall. **267**, 52, 40-E7 (1983)
- The Stellar Kinematics and Dynamics of Barred Galaxies. I. NGC 936. John Kormendy. **275**, 529, 143-C7 (1983)
- The Distribution of Molecular Clouds in the Nuclear Region of NGC 1068. N. Z. Scoville, Judith S. Young, and L. B. Lucy. **270**, 443, 83-A10 (1983)
- Radio Jets and High-Velocity Gas in the Seyfert Galaxy NGC 1068. A. S. Wilson and J. S. Ulvestad. **275**, 8, 137-A14 (1983)
- Study of the Close Environment of the Active Nucleus in NGC 1068 by Decomposition of [O III] and H $\beta$  Emission-Line Profiles. Danielle Alloin, Didier Pelat, Alec Boksenberg, and Wallace L. W. Sargent. **275**, 493, 142-G10 (1983)
- Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney. **265**, 107, 13-C2 (1983)
- H I Observations of the High-Velocity System in NGC 1275. J. H. van Gorkom and R. D. Ekers. **267**, 528, 46-E12 (1983)
- NGC 1275: A Burgeoning Elliptical Galaxy. A. Wirth, S. J. Kenyon, and D. A. Hunter. **269**, 102, 66-A13 (1983)
- Gamma-Ray Observations toward NGC 1275, and the Origin of the Emission in the Infrared, X-Rays, and Gamma-Rays. A. W. Strong and G. F. Bignami. **274**, 549, 131-C6 (1983)
- The Filaments of NGC 1275: A Collision between a Galaxy and an Accretion Flow? E. M. Hu, L. L. Cowie, P. Kaaret, E. B. Jenkins, D. G. York, and F. L. Roesler. **275**, L27, 148-A4 (1983)
- Infrared Mapping and UBVRI Photometry of the Spiral Galaxy NGC 1566. John A. Hackwell and François Schweizer. **265**, 643, 19-E11 (1983)
- The Nuclear Radio Source of the X-Ray Galaxy NGC 2110. James S. Ulvestad and Andrew S. Wilson. **264**, L7, 5-A8 (1983)
- [NGC 3311] Globular Cluster Systems in the Hydra I Elliptical Galaxies. II. William E. Harris, Malcolm G. Smith, and Eric

## Galaxies: Individual—Continued

- S. Myra.* **272**, 456, 106-F13 (1983)
- Luminosity Distribution in Galaxies. II. A Study of Accidental and Systematic Errors with Application to NGC 3379. *M. Capaccioli and G. de Vaucouleurs.* **52**, 465, 16-E10 (1983) (Abstr. in **270**, 781, 86-E8)
- The Ultraviolet Spectrum of the Seyfert Galaxies NGC 3516 and NGC 5548. *M. H. Ulrich and C. Boisson.* **267**, 515, 46-D13 (1983)
- CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. *Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville.* **269**, 136, 66-E5 (1983)
- CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. *Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville.* **269**, 136, 66-E5 (1983)
- CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. *Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville.* **269**, 136, 66-E5 (1983)
- Star Bursts and the Extraordinary Galaxy NGC 3690. *R. D. Gehrz, R. A. Sramek, and D. W. Weedman.* **267**, 551, 46-G7 (1983)
- Luminous Molecular Hydrogen Emission in the Galaxy System NGC 3690-IC 694. *J. Fischer, M. Simon, J. Benson, and P. M. Solomon.* **273**, L27, 117-C13 (1983)
- [NGC 4051] Upper Limits to O III  $\lambda 5592$  and [Ni IX]  $\lambda 4594$  in Seyfert Galaxies. *Donald E. Osterbrock, Oved Dahari, and Jan Olof Ekberg.* **273**, L31, 117-D3 (1983)
- Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith.* **274**, 571, 131-E1 (1983)
- Spatially Extended Narrow Emission-Line Gas in the Seyfert Galaxy NGC 4151. *Timothy M. Heckman and Bruce Balick.* **268**, 102, 53-A9 (1983)
- Extended Soft X-Ray Emission from NGC 4151. *Martin Elvis, Ulrich G. Briel, and J. Patrick Henry.* **268**, 105, 53-A13 (1983)
- Time Development of the Emission Lines and Continuum of NGC 4151. *Robert R. J. Antonucci and Ross D. Cohen.* **271**, 564, 95-E14 (1983)
- [NGC 4151] Upper Limits to O III  $\lambda 5592$  and [Ni IX]  $\lambda 4594$  in Seyfert Galaxies. *Donald E. Osterbrock, Oved Dahari, and Jan Olof Ekberg.* **273**, L31, 117-D3 (1983)
- Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. *John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson.* **274**, 125, 125-C5 (1983)
- Confirmation of the Luminous Connection between NGC 4319 and Markarian 205. *Jack W. Sulentic.* **265**, L49, 26-B2 (1983)
- The Spatial Distribution of H II Regions in NGC 4321. *Scott Anderson, Paul Hodge, and Robert C. Kennicutt, Jr.* **265**, 132, 13-E2 (1983)
- VLA Observations of the Luminous Supernova Remnant in NGC 4449. *R. C. Bignell and E. R. Seaquist.* **270**, 140, 78-D10 (1983)
- The Extraordinary Extragalactic Supernova Remnant in NGC 4449. II. X-Ray and Optical Investigations. *William P. Blair, Robert P. Kirshner, and P. Frank Winkler, Jr.* **272**, 84, 102-A3 (1983)
- The Type I Supernova 1981b in NGC 4536: The First 100 Days. *David Branch, C. H. Lacy, Marshall L. McCall, P. G. Sutherland, A. Uomoto, J. C. Wheeler, and B. J. Wills.* **270**, 123, 78-C9 (1983)
- Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. *John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson.* **274**, 125, 125-C5 (1983)
- The Transitory Nature of the Filaments in NGC 5128 (Centaurus A). *J. A. Graham.* **269**, 440, 71-C7 (1983)
- [NGC 5128] The Inner Radio Structure of Centaurus A: Clues to the Origin of the Jet X-Ray Emission. *Jack O. Burns, Eric D. Feigelson, and Ethan J. Schreier.* **273**, 128, 113-E6 (1983)
- [NGC 5128] The Discovery of Optical Emission Knots in the Inner Jet of Centaurus A. *Jean Brodie, Arie König, and Stuart Bowyer.* **273**, 154, 113-G7 (1983)
- X-Ray and Ultraviolet Observations of Extragalactic H II Regions. *G. Fabbiano and N. Panagia.* **266**, 568, 34-D12 (1983)
- The Probable Association of SN 1957d in NGC 5236 (M83) with an Unresolved Radio Source. *Robert L. Pennington and Reginald J. Dufour.* **270**, L7, 81-A8 (1983)
- The Ultraviolet Spectrum of the Seyfert Galaxies NGC 3516 and NGC 5548. *M. H. Ulrich and C. Boisson.* **267**, 515, 46-D13 (1983)
- Detection of  $10^{10} M_{\odot}$  of Hot Gas in the Normal Elliptical Galaxy NGC 5846 with the Einstein Satellite. *Peter Biermann and Philipp P. Kronberg.* **268**, L69, 63-E1 (1983)
- The Distance to NGC 6822 from Infrared Photometry of Cepheids. *Christopher W. McAlary, Barry F. Madore, R. McGonegal, R. A. McLaren, and D. L. Welch.* **273**, 539, 119-D12 (1983)
- Wolf-Rayet Stars in the Local Group Galaxies M31 and NGC 6822. *Anthony F. J. Moffat and Michael M. Shara.* **273**, 544, 119-E3 (1983)
- The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams.* **274**, 168, 125-F6 (1983)
- By Other Designation: Names
- Arp 102B: A New and Unusual Broad-Line Galaxy. *John Stauffer, Rudolph Schild, and William Keel.* **270**, 465, 83-C3 (1983)
- The Carina Dwarf Spheroidal—An Intermediate Age Galaxy. *Jeremy Mould and Marc Aaronson.* **273**, 530, 119-C14 (1983)
- VLBI Observations of the Nucleus of Centaurus A. *Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **266**, L93, 39-B8 (1983)
- Radio Structure and Optical Kinematics of the cD Galaxy Hydra A (3C 218). *R. D. Ekers and S. M. Simkin.* **265**, 85, 13-A5 (1983)
- [Leo Triplet] CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. *Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville.* **269**, 136, 66-E5 (1983)
- Confirmation of the Luminous Connection between NGC 4319 and Markarian 205. *Jack W. Sulentic.* **265**, L49, 26-B2 (1983)
- A Variable Radio Source in the Clumpy Irregular Galaxy Markarian 297. *D. S. Heeschen, J. Heidmann, and Q. F. Yin.* **267**, L73, 51-A7 (1983)
- Outflow of Gas in the Seyfert 1 Galaxy Markarian 509. *M. M. Phillips, J. A. Baldwin, Bruce Atwood, and R. F. Carswell.* **274**, 558, 131-D1 (1983)
- Mrk 744 and Mrk 1066: Two Seyfert Galaxies with Strong Absorption-Line Spectra. *Robert W. Goodrich and Donald E. Osterbrock.* **269**, 416, 71-A9 (1983)
- Mrk 744 and Mrk 1066: Two Seyfert Galaxies with Strong Absorption-Line Spectra. *Robert W. Goodrich and Donald E. Osterbrock.* **269**, 416, 71-A9 (1983)
- [Sculptor Dwarf Spheroidal] The Chemical Inhomogeneity of the Sculptor Dwarf Spheroidal Galaxy. *Graeme H. Smith and Michael A. Dopita.* **271**, 113, 89-B11 (1983)
- Photometry of Resolved Galaxies. II. Sextans A. *J. G. Hoessel, R. A. Schommer, and G. E. Danielson.* **274**, 577, 131-E8 (1983)
- By Other Designation: Alphanumeric
- Radio and Optical Observations of the Alleged Optical Jet in DA 240. *Wil van Breugel, Timothy Heckman, Alan Bridle,*

- Harvey Butcher, Richard Strom, and Bruce Balick. **275**, 61, 137-E11 (1983)
- The Magellanic Irregular Galaxy DDO 155. *G. de Vaucouleurs and C. Moss*. **271**, 123, 89-C7 (1983)
- Photometry of Resolved Galaxies. III. GR 8. *J. G. Hoessel and G. E. Danielson*. **271**, 65, 88-E14 (1983)
- VLA Observations of Extragalactic NH<sub>3</sub> in IC 342. *Paul T. P. Ho and Robert N. Martin*. **272**, 484, 107-B3 (1983)
- Luminous Molecular Hydrogen Emission in the Galaxy System NGC 3690-IC 694. *J. Fischer, M. Simon, J. Benson, and P. M. Solomon*. **273**, L27, 117-C13 (1983)
- MCG 5-29-86: A Galaxy with a Prolate Central Bulge? *Ken-ichi Wakamatsu and Halton C. Arp*. **273**, 167, 114-A8 (1983)
- The Noninteracting Spiral Pair, NGC 450/UGC 807. *Vera C. Rubin and W. Kent Ford, Jr.* **271**, 556, 95-E5 (1983)
- A Multifrequency Study of Star Formation in the Blue Compact Dwarf Galaxy I Zw 36. *F. Viallefond and Trinh X. Thuan*. **269**, 444, 71-C11 (1983)
- [III Zw 77] Upper Limits to O III  $\lambda$ 5592 and [Ni IX]  $\lambda$ 4594 in Seyfert Galaxies. *Donald E. Osterbrock, Oved Dahari, and Jan Olof Ekberg*. **273**, L31, 117-D3 (1983)
- [3C 218] Radio Structure and Optical Kinematics of the cD Galaxy Hydra A (3C 218). *R. D. Ekers and S. M. Simkin*. **265**, 85, 13-A5 (1983)
- The Nature of the Cluster Surrounding 3C 295. *Sidney van den Bergh*. **265**, 606, 19-B14 (1983)
- cD Galaxy Dynamics and An Aged Ridge (Jet) in 3C 338. *Jack O. Burns, Erik Schwendeman, and Richard A. White*. **271**, 575, 95-G2 (1983)
- Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. *A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney*. **265**, 107, 13-C2 (1983)
- Galaxies: Intergalactic Medium**
- Observational Constraints on Galaxy-IGM Interactions in the Virgo Cluster. *John R. Stauffer*. **264**, 14, 1-B5 (1983)
- On the Possibility of Detecting Very Hot Gas through Absorption-Line Studies. *D. G. York and L. L. Cowie*. **264**, 49, 1-D12 (1983)
- The Structure and Expansion Law of a Shock Wave in an Expanding Universe. *Satoru Ikeuchi, Kohji Tomisaka, and Jeremiah P. Ostriker*. **265**, 583, 19-A5 (1983)
- High-Resolution Spectroscopy of Selected Absorption Lines toward Quasi-stellar Objects. I. Lyman-Alpha toward PHL 957. *Frederic H. Chaffee, Jr., Ray J. Weymann, David W. Latham, and Peter A. Strittmatter*. **267**, 12, 40-B3 (1983)
- Effects of Galaxy Collisions on the Structure and Evolution of Galaxy Clusters. I. Mass and Luminosity Functions and Background Light. *Glenn E. Miller*. **268**, 495, 58-D9 (1983)
- Why High-Latitude Clouds in Our Galaxy and the Highly Redshifted Clouds Observed in Front of QSOs Do Not Belong to the Same Parent Population. *A. M. Wolfe*. **268**, L1, 57-A3 (1983)
- Physical Properties of the Intergalactic Medium and the Lyman-Alpha Absorbing Clouds. *Jeremiah P. Ostriker and Satoru Ikeuchi*. **268**, L63, 63-D9 (1983)
- Detection of  $10^{10} M_{\odot}$  of Hot Gas in the Normal Elliptical Galaxy NGC 5846 with the Einstein Satellite. *Peter Biermann and Philipp P. Kronberg*. **268**, L69, 63-E1 (1983)
- X-Ray Observations of 20 3CR Radio Galaxies and Their Environments. *Eric D. Feigelson and Christophe J. Berg*. **269**, 400, 70-G7 (1983)
- Radio and X-Ray Observations of the Radio Halo Source in A1367. *G. Gavazzi and G. Trinchieri*. **270**, 410, 82-E12 (1983)
- Why High-Latitude Clouds in Our Galaxy and the Highly Redshifted Clouds Observed in Front of QSOs Do Not Belong to the Same Parent Population: Erratum. *A. M. Wolfe*. **271**, L43, 93-D3 (1983) (Orig. paper in **268**, L1, 57-A3)
- Two-dimensional Spectrophotometry of the Cores of X-Ray Luminous Clusters. *L. L. Cowie, E. M. Hu, E. B. Jenkins, and D. G. York*. **272**, 29, 101-C6 (1983)
- Radiative Accretion of Intracluster Gas onto Dominant Galaxies in Poor Clusters. *Claude R. Canizares, Gordon C. Stewart, and Andrew C. Fabian*. **272**, 449, 106-F6 (1983)
- Common Lyman-Alpha Absorption Lines in the Triple QSO PG 1115+08. *Ray J. Weymann and Craig B. Foltz*. **272**, L1, 105-D2 (1983)
- The Oxygen Abundance in the Clouds Producing the Ly $\alpha$ -Ly $\beta$  Absorption Systems in the Quasars 4C 5.34 (0805+046) and OQ 172 (1442+101). *John Norris, F. D. A. Hartwick, and B. A. Peterson*. **273**, 450, 118-D4 (1983)
- Discovery of a Large Intergalactic H I Cloud in the M96 Group. *Stephen E. Schneider, George Helou, Edwin E. Salpeter, and Yervant Terzian*. **273**, L1, 117-B2 (1983)
- Test of a Class of Models for the Variable Absorption Lines in AO 0235+164. *F. H. Briggs*. **274**, 86, 124-G8 (1983)
- The Filaments of NGC 1275: A Collision between a Galaxy and an Accretion Flow? *E. M. Hu, L. L. Cowie, P. Kaaret, E. B. Jenkins, D. G. York, and F. L. Roesler*. **275**, L27, 148-A4 (1983)
- Search for Extragalactic Backgrounds in the Far-Infrared. *C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera*. **275**, L39, 148-B7 (1983)
- Galaxies: Internal Motions**
- Preferred Orbit Planes in the Gravitational Field of a Tumbling Spheroidal Galaxy. *Richard H. Durisen, Joel E. Tohline, Joseph A. Burns, and Anthony R. Dobrovolskis*. **264**, 392, 6-E9 (1983)
- The Rotation of Elliptical Galaxies: An Application of the Theory of Tidal Torques. *George Lake*. **264**, 408, 6-F11 (1983)
- On the Global Density Waves in Self-gravitating Flat Disks. *Ashok Ambastha and Ram K. Varma*. **264**, 413, 6-G2 (1983)
- A Simple Theory of How Spiral Galaxies Acquire Their Principal Global Properties. *David Burstein and Craig L. Sarazin*. **264**, 427, 7-A6 (1983)
- Gravitationally Induced Spurs in Spiral Galaxies: An Example in M31. *Gene G. Byrd*. **264**, 464, 7-D4 (1983)
- Radio Structure and Optical Kinematics of the cD Galaxy Hydra A (3C 218). *R. D. Ekers and S. M. Simkin*. **265**, 85, 13-A5 (1983)
- The Effects of Induced Star Formation on the Evolution of the Galaxy. II. The Galactic Ecosystem. *Steven N. Shore*. **265**, 202, 14-C14 (1983)
- The  $L \propto \sigma^4$  Relation for the Bulge Components of Disk Galaxies. *John Kormendy and Garth Illingworth*. **265**, 632, 19-D13 (1983)
- Rotational Velocities and Central Velocity Dispersions for a Sample of S0 Galaxies. *Alan Dressler and Allan Sandage*. **265**, 664, 19-G6 (1983)
- The Long Term Evolution of Rotating Stellar Bars. *P. Carnevali*. **265**, 701, 20-D4 (1983)
- The H I Distribution in an Extremely Faint Dwarf Irregular Galaxy M81 dwA. *W. L. W. Sargent, R. Sancisi, and K. Y. Lo*. **265**, 711, 20-D14 (1983)
- The Galactic Spheroid. *John N. Bahcall, Maarten Schmidt, and Raymond M. Soneira*. **265**, 730, 20-F6 (1983)
- The Kinematic Properties of Faint Elliptical Galaxies. *Roger L. Davies, George Efsthathiou, S. Michael Fall, Garth Illingworth, and Paul L. Schechter*. **266**, 41, 27-D4 (1983)
- Anisotropic Velocity Dispersions in Spherical Galaxies. *John L. Tonry*. **266**, 58, 27-E7 (1983)
- Dynamics of Yet More Ellipticals and Bulges. *Roger L. Davies and Garth Illingworth*. **266**, 516, 34-A1 (1983)
- Is There Nonluminous Matter in Dwarf Spheroidal Galaxies? *S. M. Faber and D. N. C. Lin*. **266**, L17, 32-B3 (1983)
- Flocculent and Grand Design Spiral Galaxies in Groups: Time Scales for the Persistence of Grand Design Spiral Structures. *Bruce G. Elmegreen and Debra Meloy Elmegreen*. **267**, 31, 40-C8 (1983)
- The Ratio of the Unseen Halo Mass to the Luminous Disk

**Galaxies: Internal Motions—Continued**

- Mass in NGC 891. *John N. Bahcall*. **267**, 52, 40-E7 (1983)
- Modeling of Steady, Rotational, Transonic Winds from Rotating Stars and Galaxies. *D. A. Kopriva and J. R. Jokipii*. **267**, 62, 40-F3 (1983)
- Stellar Orbits in a Triaxial Galaxy. I. Orbits in the Plane of Rotation. *Tim de Zeeuw and David Merritt*. **267**, 571, 47-A13 (1983)
- The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. I. The Basic Scale Factors of the Galaxy and Two Kinematic Tests of the Long and Short Distance Scales. *G. de Vaucouleurs*. **268**, 451, 58-A5 (1983)
- Estimating the Tumble Rates of Galaxy Halos. *Gregory F. Simonson and Joel E. Tohline*. **268**, 638, 60-B10 (1983)
- On the Equilibrium Configurations of Prolate, Axisymmetric Stellar Systems. *Courtlandt L. Bohn*. **268**, 646, 60-C4 (1983)
- The Transitory Nature of the Filaments in NGC 5128 (Centaurus A). *J. A. Graham*. **269**, 440, 71-C7 (1983)
- Analysis of Box Orbits in a Triaxial Galaxy. *M. Vietri and M. Schwarzschild*. **269**, 487, 71-F13 (1983)
- Can Secondary Infall Produce Flat Rotation Curves? *Carlton Pryor and Myron Lecar*. **269**, 513, 72-A14 (1983)
- Stellar and Gaseous Dynamics of Triaxial Galaxies. *George Lake and Colin Norman*. **270**, 51, 77-E2 (1983)
- Stochastic Self-propagating Star Formation in Three-dimensional Disk Galaxy Simulations. *Thomas Statler, Neil Comins, and Bruce F. Smith*. **270**, 79, 77-G3 (1983)
- A Modification of the Newtonian Dynamics as a Possible Alternative to the Hidden Mass Hypothesis. *M. Milgrom*. **270**, 365, 82-B5 (1983)
- A Modification of the Newtonian Dynamics: Implications for Galaxies. *M. Milgrom*. **270**, 371, 82-B11 (1983)
- Dynamics of the Stellar Component of the Bulge of M31. *Douglas B. McElroy*. **270**, 485, 83-D12 (1983)
- The Velocity Dispersion of the Globular Clusters in the Fornax Dwarf Galaxy. *Judith G. Cohen*. **270**, L41, 87-A12 (1983)
- The Noninteracting Spiral Pair, NGC 450/UGC 807. *Vera C. Rubin and W. Kent Ford, Jr.* **271**, 556, 95-E5 (1983)
- cD Galaxy Dynamics and An Aged Ridge (Jet) in 3C 338. *Jack O. Burns, Erik Schwendeman, and Richard A. White*. **271**, 575, 95-G2 (1983)
- Spiral Gravitational Potentials and the Mass Growth of Molecular Clouds. *John Kwan and Francisco Valdes*. **271**, 604, 96-B5 (1983)
- Implications of HEAO 3 Data for the Acceleration and Propagation of Galactic Cosmic Rays. *J. F. Ormes and R. J. Protheroe*. **272**, 756, 110-A8 (1983)
- Some Current Trends in Milky Way Research. *Bart J. Bok*. **273**, 411, 118-A5 (1983)
- On the Oscillations and the Stability of Stellar Systems. *Peter O. Vandervoort*. **273**, 511, 119-B9 (1983)
- Velocity Dispersion of Planetary Nebulae in the Nuclear Bulge of M31. *David G. Lawrie*. **273**, 562, 119-F8 (1983)
- Outflow of Gas in the Seyfert 1 Galaxy Markarian 509. *M. M. Phillips, J. A. Baldwin, Bruce Atwood, and R. F. Carswell*. **274**, 558, 131-D1 (1983)
- Stellar Evolution in N-Body Simulations of Disk Galaxies. I. *Neil F. Comins*. **274**, 595, 132-A1 (1983)
- Winds in Elliptical Galaxies. *Raymond E. White III and Roger A. Chevalier*. **275**, 69, 137-F11 (1983)
- Study of the Close Environment of the Active Nucleus in NGC 1068 by Decomposition of [O III] and H $\beta$  Emission-Line Profiles. *Danielle Alloin, Didier Pelat, Alec Boksenberg, and Wallace L. W. Sargent*. **275**, 493, 142-G10 (1983)
- Bifurcations, Gaps, and Stochasticity in Barred Galaxies. *G. Contopoulos*. **275**, 511, 143-B3 (1983)
- The Stellar Kinematics and Dynamics of Barred Galaxies. I. NGC 936. *John Kormendy*. **275**, 529, 143-C7 (1983)
- New Central Velocity Dispersions for the Bulges of 53 Spiral

and S0 Galaxies. *Paul L. Schechter*. **52**, 425, 16-B4 (1983) (Abstr. in **270**, 780, 86-E7)

Felicity Fields in Late-Type Galaxies from H $\alpha$  Fabry-Perot Interferometry. IV. Kinematics and Dynamics of the SAB(s)c Spiral NGC 5236 (M83). *G. de Vaucouleurs, W. D. Pence, and E. Davoust*. **53**, 17, 17-B6 (1983) (Abstr. in **271**, 889, 99-B11)

**Galaxies: Jets**

- Beam Models for Radio Sources. IV. Improved Jet Collimation. *M. Javad Siah and Paul J. Wiita*. **270**, 427, 82-G1 (1983)
- Focusing of High-Mach Number Jets by an Ambient Medium. *David Eichler*. **272**, 48, 101-E7 (1983)
- VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young*. **272**, 383, 106-A5 (1983)
- A Single Exhaust Model for Backward Emission in Doppler Quasars. *J. V. Narlikar and K. Subramanian*. **273**, 44, 112-E10 (1983)
- The Inner Radio Structure of Centaurus A: Clues to the Origin of the Jet X-Ray Emission. *Jack O. Burns, Eric D. Feigelson, and Ethan J. Schreier*. **273**, 128, 113-E6 (1983)
- Observations of the M87 Jet at 15 GHz with 0.12 Resolution. *J. A. Biretta, Frazer N. Owen, and Philip E. Hardee*. **274**, L27, 129-B10 (1983)
- Radio Jets and High-Velocity Gas in the Seyfert Galaxy NGC 1068. *A. S. Wilson and J. S. Ulvestad*. **275**, 8, 137-A14 (1983)
- Radio and Optical Observations of the Alleged Optical Jet in DA 240. *Wil van Breugel, Timothy Heckman, Alan Bridle, Harvey Butcher, Richard Strom, and Bruce Balick*. **275**, 61, 137-E11 (1983)

**Galaxies: Local Group**

- The Chemical Inhomogeneity of the Sculptor Dwarf Spheroidal Galaxy. *Graeme H. Smith and Michael A. Dopita*. **271**, 113, 89-B11 (1983)
- The Magellanic Irregular Galaxy DDO 155. *G. de Vaucouleurs and C. Moss*. **271**, 123, 89-C7 (1983)
- The Distance to NGC 6822 from Infrared Photometry of Cepheids. *Christopher W. McAlary, Barry F. Madore, R. McGonegal, R. A. McLaren, and D. L. Welch*. **273**, 539, 119-D12 (1983)

**Galaxies: Magellanic Clouds**

- Carbon Stars in Local Group Galaxies. *Harvey B. Richer and Bengt E. Westerlund*. **264**, 114, 2-B10 (1983)
- Wolf-Rayet Stars in the LMC: How Faint Are the Faintest? *Philip Massey and Peter S. Conti*. **264**, 126, 2-C8 (1983)
- Age Calibrations of Magellanic Cloud Clusters. *P. W. Hodge*. **264**, 470, 7-D10 (1983)
- Discovery of 13.5 s X-Ray Pulsations from LMC X-4 and an Orbital Determination. *R. L. Kelley, J. G. Jernigan, A. Levine, L. D. Petro, and S. Rappaport*. **264**, 568, 8-D13 (1983)
- Studies of Luminous Stars in Nearby Galaxies. VIII. The Small Magellanic Cloud. *Roberta M. Humphreys*. **265**, 176, 14-A5 (1983)
- The Wavelength Dependence of Interstellar Polarization in the Large Magellanic Cloud. *Geoffrey C. Clayton, P. G. Martin, and Ian Thompson*. **265**, 194, 14-C3 (1983)
- Metal-deficient O9-B0 Supergiants in the Small Magellanic Cloud. *Nolan R. Walborn*. **265**, 716, 20-E6 (1983)
- Faint Star Studies in the Magellanic Clouds. I. RICHFLD Photographic Photometry in NGC 2257. *L. L. Stryker*. **266**, 82, 27-G3 (1983)
- Photometric Studies of Composite Stellar Systems. V. Infrared Photometry of Star Clusters in the Magellanic Clouds. *S. E. Persson, M. Aaronson, Judith G. Cohen, Jay A. Frogel, and K. Matthews*. **266**, 105, 28-B2 (1983)
- A Two-Component X-Ray Spectrum from SMC X-1. *F. E. Marshall, N. E. White, and R. H. Becker*. **266**, 814, 37-C4 (1983)



- Ultraviolet Interstellar Absorption toward HD 5980 in the Small Magellanic Cloud. *Edward L. Fitzpatrick and Blair D. Savage*. **267**, 93, 41-A6 (1983)
- Ring Ejection in Type II Supernovae: 1E 0102.2-7219 in the Small Magellanic Cloud. *Ian R. Tuohy and Michael A. Dopita*. **268**, L11, 57-A11 (1983)
- Ring Nebulae Associated with Wolf-Rayet Stars in the Large Magellanic Cloud. III. Kinematics of DEM 39, 231, 240, and 315. *You-Hua Chu*. **269**, 202, 67-D1 (1983)
- A Comparison between Observed and Theoretical H-R Diagrams for the Young LMC Star Cluster NGC 1866. *Stephen A. Becker and Grant J. Mathews*. **270**, 155, 78-E12 (1983)
- Long-Period Variables in the Magellanic Clouds: Supergiants, AGB Stars, Supernova Precursors, Planetary Nebula Precursors, and Enrichment of the Interstellar Medium. *P. R. Wood, M. S. Bessell, and M. W. Fox*. **272**, 99, 102-B8 (1983)
- A Comment on Red Supergiant Variables in the SMC. *Jay A. Frogel*. **272**, 116, 102-C11 (1983)
- Discovery of a Massive Unseen Star in LMC X-3. *A. P. Cowley, D. Crampton, J. B. Hutchings, R. Remillard, and J. E. Penfold*. **272**, 118, 102-C13 (1983)
- The Kinematics of Globular Clusters in the Large Magellanic Cloud. *K. C. Freeman, Garth Illingworth, and Augustus Oemler, Jr.* **272**, 488, 107-B7 (1983)
- The Extreme LMC Supergiant HD 38489: An Optical and Ultraviolet Study. *Steven N. Shore and N. Sanduleak*. **273**, 177, 114-B8 (1983)
- A Spectroscopic Study of Some Planetary Nebulae in the Large Magellanic Cloud. *Lawrence H. Aller*. **273**, 590, 120-A8 (1983)
- Photometry of Resolved Galaxies. II. Sextans A. *J. G. Hoessel, R. A. Schommer, and G. E. Danielson*. **274**, 577, 131-E8 (1983)
- Evidence for Two Discrete Epochs of Star Formation in the Large Magellanic Cloud. *Jay A. Frogel and V. M. Blanco*. **274**, L57, 136-A13 (1983)
- The Age and Composition of the LMC Red Globular Cluster NGC 2121. *Phillip Flower, Douglas Geisler, Paul Hodge, Edward Olszewski, and Robert Schommer*. **275**, 15, 137-B7 (1983)
- An Infrared Search for Luminous Stars in the Bar West Field of the Large Magellanic Cloud. *Jay A. Frogel and Harvey B. Richer*. **275**, 84, 138-A1 (1983)
- Observations of Two Peculiar Emission Objects in the Large Magellanic Cloud. *M. Kafatos, A. G. Michalitsianos, D. A. Allen, and R. E. Stencel*. **275**, 584, 144-A1 (1983)
- The Kinematics and Structure of N63A and Associated H II Regions. *Peter Shull, Jr.* **275**, 592, 144-A9 (1983)
- The Kinematics and Structure of N49. *Peter Shull, Jr.* **275**, 611, 144-C2 (1983)
- A Spectrographic Orbit for LMC X-1: Another Massive X-Ray Source? *J. B. Hutchings, D. Crampton, and A. P. Cowley*. **275**, L43, 148-B11 (1983)
- Supernova Remnants in the Magellanic Clouds. *D. S. Mathewson, V. L. Ford, M. A. Dopita, I. R. Tuohy, K. S. Long, and David J. Helfand*. **51**, 345, 7-F1 (1983) (Abstr. in **266**, 902, 38-B11)
- Galaxies: Milky Way**
- Absorption of Halo Gas in the Direction of M13. *Klaas S. de Boer and Blair D. Savage*. **265**, 210, 14-D8 (1983)
- The Supernova near the Nuclei of M31 and the Galaxy. *Sidney van den Bergh*. **265**, 719, 20-E9 (1983)
- A Bisymmetric Spiral Magnetic Field and the Spiral Arms in Our Galaxy. *Y. Sofue and M. Fujimoto*. **265**, 722, 20-E12 (1983)
- The Galactic Spheroid. *John N. Bahcall, Maarten Schmidt, and Raymond M. Soneira*. **265**, 730, 20-F6 (1983)
- Long-Period Variables in the Galactic Bulge: Evidence for a Young Super-Metal-rich Population. *P. R. Wood and M. S. Bessell*. **265**, 748, 21-A1 (1983)
- Extinction to Ionized Gas at the Galactic Center. *S. P. Willner and Judith L. Pipher*. **265**, 760, 21-A13 (1983)
- Kinematics of the Late M Stars in the Galactic Nuclear Bulge. *J. R. Mould*. **266**, 255, 29-F6 (1983)
- The Galactic Gradient in Electron Temperature from Observations of Low-Density H II Regions. *Guido Garay and Luis F. Rodriguez*. **266**, 263, 29-G1 (1983)
- CO Emission in the Outer Galaxy between Longitudes 50° and 72°. *P. M. Solomon, A. A. Stark, and D. B. Sanders*. **267**, L29, 45-D6 (1983)
- Stellar Collapses in the Galaxy. *John N. Bahcall and Tsvi Piran*. **267**, L77, 51-A11 (1983)
- The Galactic Gamma-Ray Source Population. *C. P. Godfrey*. **268**, 111, 53-B5 (1983)
- The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. II. Comparisons of Metric and Photometric Scale Lengths and Three Further Tests of the Long and Short Distance Scales. *G. de Vaucouleurs*. **268**, 468, 58-B8 (1983)
- Interstellar H $\alpha$  Emission along the Galactic Equator. *R. J. Reynolds*. **268**, 698, 60-G1 (1983)
- SOLRAD II Observations of the Far-Ultraviolet Background. *C. S. Weller*. **268**, 899, 63-A1 (1983)
- The Gas Density and Distribution within 2 Parsecs of the Galactic Center. *Robert L. Brown and K. J. Johnston*. **268**, L85, 63-F1 (1983)
- The Galaxy's 157 Micron [C II] Emission: Observations by Means of a Spectroscopic Lunar Occultation Technique. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit*. **268**, L99, 63-G14 (1983)
- The Soft X-Ray Diffuse Background. *D. McCammon, D. N. Burrows, W. T. Sanders, and W. L. Kraushaar*. **269**, 107, 66-B4 (1983)
- Prediction of Interstellar Antiproton Flux Using a Nonuniform Galactic Disk Model. *L. C. Tan and L. K. Ng*. **269**, 751, 74-F6 (1983)
- Measurements of Galactic Plane Gamma-Ray Emission in the Energy Range 10-80 MeV. *D. L. Bertsch and D. A. Kniffen*. **270**, 305, 80-C2 (1983)
- Scalloped Disk Galaxies: A Kelvin-Helmholtz Instability? *Robert C. Fleck, Jr.* **270**, 507, 83-F8 (1983)
- Neutral Interstellar Gas in the Lower Galactic Halo. *C. E. Albert*. **272**, 509, 107-C14 (1983)
- Self-regulated Star Formation in the Galaxy. *José Franco and Donald P. Cox*. **273**, 243, 115-A1 (1983)
- Some Current Trends in Milky Way Research. *Bart J. Bok*. **273**, 411, 118-A5 (1983)
- Interstellar Absorption Lines in the Spectrum of 3C 273. *D. G. York, C. C. Wu, S. Ratcliffe, J. C. Blades, L. L. Cowie, and D. C. Morton*. **274**, 136, 125-D2 (1983)
- Metal Content of K Giants in the Nuclear Bulge of the Galaxy. *A. E. Whitford and R. M. Rich*. **274**, 723, 133-C8 (1983)
- Planetary Nebulae and the Galactic Rotation Curve. *Stephen E. Schneider and Yervant Terzian*. **274**, L61, 136-B3 (1983)
- Molecular Emission Which Is Probably Localized within the Central 10 Parsecs of the Galaxy. *Y. Fukui, H. Ogawa, and S. Deguchi*. **275**, L55, 148-C9 (1983)
- A Survey of H I Absorption at Low Latitudes. *John M. Dickey, Shrinivas R. Kulkarni, J. H. van Gorkom, and Carl E. Heiles*. **53**, 591, 24-G11 (1983) (Abstr. in **273**, 840, 122-F10)
- AB Stars in the Southern Galactic Halo. II. Spectroscopy and Radial Velocities. *Jeffrey R. Pier*. **53**, 791, 27-E2 (1983) (Abstr. in **274**, 922, 135-E3)
- Galaxies: Nuclei**
- The Absence of Rapid X-Ray Variability in Active Galaxies. *Allyn F. Tennant and R. F. Mushotzky*. **264**, 92, 2-A1 (1983)
- Are There Any Shock-heated Galaxies? *Gary J. Ferland and Hagai Netzer*. **264**, 105, 2-B1 (1983)
- Bubbles, Jets, and Clouds in Active Galactic Nuclei. *Michael*

## Galaxies: Nuclei—Continued

- D. Smith, Larry Smarr, Michael L. Norman, and James R. Wilson. **264**, 432, 7-A11 (1983)
- The Reddening of Active Galactic Nuclei. Matthew A. Malkan. **264**, L1, 5-A2 (1983)
- Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney. **265**, 107, 13-C2 (1983)
- Cosmic Rays from Active Galactic Nuclei and in Metagalactic Space. M. M. Shapiro and R. Silberberg. **265**, 570, 18-C1 (1983)
- A Clamshell for Blandford-Rees Jets. Vincent Icke. **265**, 648, 19-F4 (1983)
- The Supernova near the Nuclei of M31 and the Galaxy. Sidney van den Bergh. **265**, 719, 20-E9 (1983)
- Extinction to Ionized Gas at the Galactic Center. S. P. Willner and Judith L. Pipher. **265**, 760, 21-A13 (1983)
- The Arc Second Radio Structure of 12 BL Lacertae Objects. J. S. Ulvestad, K. J. Johnston, and K. W. Weiler. **266**, 18, 27-B9 (1983)
- Toward Explaining Seyfert Galaxies. Daniel W. Weedman. **266**, 479, 33-E5 (1983)
- Nearby Galaxies with Seyfert-like Nuclei. M. M. Phillips, P. A. Charles, and J. A. Baldwin. **266**, 485, 33-E11 (1983)
- The Dynamics and Fueling of Active Nuclei. Colin Norman and Joseph Silk. **266**, 502, 33-F14 (1983)
- Optical Spectrophotometry of the Nuclear Region of M51. II. Further Evidence for Nuclear Activity. James A. Rose and Gerald Cecil. **266**, 531, 34-B2 (1983)
- CCD Photometry of the Center of M31. Stephen M. Kent. **266**, 562, 34-D5 (1983)
- The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger. **266**, L73, 39-A4 (1983)
- A Wind and Shock Model for Active Galactic Nuclei. M. Camenzind and Thierry J.-L. Courvoisier. **266**, L83, 39-A13 (1983)
- The Nature of the Ionizing Source of the Nuclear Gas in NGC 1052. William C. Keel and Joseph C. Miller. **266**, L89, 39-B4 (1983)
- VLBI Observations of the Nucleus of Centaurus A. Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson. **266**, L93, 39-B8 (1983)
- Spherical Accretion onto Quasars. Julian H. Krolik and Richard A. London. **267**, 18, 40-B9 (1983)
- Star Formation in the Semistellar Nucleus of M33. Robert W. O'Connell. **267**, 80, 40-G7 (1983)
- Nebular Dust and Extinction in Ionized Nebulae. I. The Balmer Decrement. John S. Mathis. **267**, 119, 41-C4 (1983)
- Comptonization Effects in Spherical Accretion onto Black Holes. James R. Ipser and Richard H. Price. **267**, 371, 43-G11 (1983)
- Anomalous Radio Continuum Features in Edge-on Spiral Galaxies. E. Hummel, J. H. van Gorkom, and C. G. Kotanyi. **267**, L5, 45-B6 (1983)
- Millimeter-Wavelength Outbursts in the Elliptical Galaxy NGC 1052. D. S. Heeschen and J. J. Puschell. **267**, L11, 45-C1 (1983)
- The Strength of Paschen-Alpha in the Seyfert 1.9 Galaxy V Zwicky 317. Richard J. Rudy and S. P. Willner. **267**, L69, 51-A4 (1983)
- Spatially Extended Narrow Emission-Line Gas in the Seyfert Galaxy NGC 4151. Timothy M. Heckman and Bruce Balick. **268**, 102, 53-A9 (1983)
- Extended Soft X-Ray Emission from NGC 4151. Martin Elvis, Ulrich G. Briel, and J. Patrick Henry. **268**, 105, 53-A13 (1983)
- Monte Carlo Simulations of the Evolution of Galactic Nuclei Containing Massive, Central Black Holes. Martin J. Duncan and Stuart L. Shapiro. **268**, 565, 59-C1 (1983)
- Star-Burst Galactic Nuclei. Vicki A. Balzano. **268**, 602, 59-E10 (1983)
- The Distribution of Ionized Gas in the Nuclei of Spiral Galaxies. William C. Keel. **268**, 632, 60-A1 (1983)
- VLA Observations of Massive Star Formation in Spiral Nuclei. J. L. Turner and P. T. P. Ho. **268**, L79, 63-E10 (1983)
- The Gas Density and Distribution within 2 Parsecs of the Galactic Center. Robert L. Brown and K. J. Johnston. **268**, L85, 63-F1 (1983)
- Relativistic Thermal Plasmas: Effects of Magnetic Fields. Sushu Araki and Alan P. Lightman. **269**, 49, 65-E2 (1983)
- Quasar Evolution and Gravitational Collapse. A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti. **269**, 57, 65-E10 (1983)
- Gravitational Radiation from Particles Falling along the Symmetry Axis into a Kerr Black Hole: The Momentum Radiated. Takashi Nakamura and Mark P. Haugan. **269**, 292, 68-C14 (1983)
- A Statistical VLBI Study of Milli-Arcsecond Cores in Extragalactic Radio Sources. Robert A. Preston, David D. Morabito, and David L. Jauncey. **269**, 387, 70-F8 (1983)
- Mrk 744 and Mrk 1066: Two Seyfert Galaxies with Strong Absorption-Line Spectra. Robert W. Goodrich and Donald E. Osterbrock. **269**, 416, 71-A9 (1983)
- 2–165 keV Observations of Active Galaxies and the Diffuse Background. R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson. **269**, 423, 71-B2 (1983)
- Spectroscopic Evidence for Activity in the Nuclei of Normal Spiral Galaxies. William C. Keel. **269**, 466, 71-E5 (1983)
- Low-Ionization Active Galactic Nuclei: X-Ray or Shock Heated? J. P. Halpern and J. E. Steiner. **269**, L37, 76-A12 (1983)
- Spectroscopy of Galaxies in Distant Clusters. II. The Population of the 3C 295 Cluster. Alan Dressler and James E. Gunn. **270**, 7, 77-A12 (1983)
- A Search for X-Ray Emission from Optically Quiet, Compact Radio Sources. J. E. Ledden and S. L. O'Dell. **270**, 434, 83-A1 (1983)
- The Distribution of Molecular Clouds in the Nuclear Region of NGC 1068. N. Z. Scoville, Judith S. Young, and L. B. Lucy. **270**, 443, 83-A10 (1983)
- Neutral Hydrogen Absorption in Early Spiral Galaxies. I. F. Mirabel. **270**, L35, 87-A7 (1983)
- Optical Polarimetry of Broad-Line Radio Galaxies. Richard J. Rudy, G. D. Schmidt, H. S. Stockman, and Richard L. Moore. **271**, 59, 88-E8 (1983)
- A 10 Micron Survey of Star Formation in Galactic Nuclei: Virgo Spiral Galaxies. N. Z. Scoville, E. E. Becklin, Judith S. Young, and R. W. Capps. **271**, 512, 95-B3 (1983)
- VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. Isabella M. Gioia, E. D. Feigelson, T. Maccacaro, R. Schild, and G. Zamorani. **271**, 524, 95-C1 (1983)
- cD Galaxy Dynamics and An Aged Ridge (Jet) in 3C 338. Jack O. Burns, Erik Schwendeman, and Richard A. White. **271**, 575, 95-G2 (1983)
- The High-Energy Spectrum of Hot Accretion Disks. Jean A. Eilek and Minas Kafatos. **271**, 804, 98-C5 (1983)
- The Emission-Line Gas in Quasars and Active Nuclei: Implications for the Nature of Core-Dominant Radio Sources. Timothy M. Heckman. **271**, L5, 93-A6 (1983)
- Evidence for a Highly Polarized Continuum in the Nucleus of NGC 1068. Joseph S. Miller and Robert R. J. Antonucci. **271**, L7, 93-A8 (1983)
- Optical Variability, Absolute Luminosity, and the Hubble Diagram for QSOs. Andrew J. Pica and Alex G. Smith. **272**, 11, 101-B2 (1983)

- The Dynamics of Dissipatively Heated Spherical Accretion. *Ernst T. Scharlemann*. **272**, 279, 104-A9 (1983)
- An Infrared and Optical Investigation of Galactic Nuclei with Compact Radio Sources. *T. M. Heckman, M. J. Lebofsky, G. H. Rieke, and W. van Breugel*. **272**, 400, 106-B8 (1983)
- Viscous Drag on an Accretion Disk due to an Embedded Stellar System. *Jeremiah P. Ostriker*. **273**, 99, 113-B14 (1983)
- The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. *John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Maccacaro, I. J. Danziger, D. Kunth, and J. Lub*. **273**, 458, 118-D12 (1983)
- Radio Emission and the Masses of Elliptical Galaxies. *Timothy M. Heckman*. **273**, 505, 119-B3 (1983)
- Quasar Evolution and Gravitational Collapse: Erratum. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti*. **273**, 837, 122-F6 (1983) (Orig. paper in **269**, 57, 65-E10)
- Shocks and Spherically Accreting Black Holes: A Model for Classical Quasars. *P. Mészáros and J. P. Ostriker*. **273**, L59, 123-A12 (1983)
- Gamma-Ray Observations toward NGC 1275, and the Origin of the Emission in the Infrared, X-Rays, and Gamma-Rays. *A. W. Strong and G. F. Bignami*. **274**, 549, 131-C6 (1983)
- O IV Temperature Determination for NGC 7662. *M. A. Shure, T. Herter, and J. R. Houck*. **274**, 646, 132-D11 (1983)
- A Thermal Interpretation of the X-Ray Spectra of Quasars, Active Galactic Nuclei, and Cygnus X-1. *P. Mészáros*. **274**, L13, 129-A12 (1983)
- Images in the Rocket Ultraviolet: The Starburst in the Nucleus of M83. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, and T. P. Stecher*. **274**, L53, 136-A8 (1983)
- Einstein X-Ray Observations of Optical-Radio Selected Areas. *P. Katgert, Trinh X. Thuan, and Rogier A. Windhorst*. **275**, 1, 137-A6 (1983)
- Radio Jets and High-Velocity Gas in the Seyfert Galaxy NGC 1068. *A. S. Wilson and J. S. Ulvestad*. **275**, 8, 137-A14 (1983)
- Broad Emission Features in QSOs and Active Galactic Nuclei. I. New Calculations of Fe II Line Strengths. *Hagai Netzer and Beverley J. Wills*. **275**, 445, 142-D4 (1983)
- The Stellar and Nonstellar Continua of Seyfert Galaxies: Non-thermal Emission in the Near-Infrared. *Matthew A. Malkan and Alexei V. Filippenko*. **275**, 477, 142-F8 (1983)
- Study of the Close Environment of the Active Nucleus in NGC 1068 by Decomposition of [O III] and H $\beta$  Emission-Line Profiles. *Danielle Alloin, Didier Pelat, Alec Boksenberg, and Wallace L. W. Sargent*. **275**, 493, 142-G10 (1983)
- X-Ray Observations of M33 with the High Resolution Imager on the Einstein Observatory. *Thomas H. Markert and Andrew D. Rallis*. **275**, 571, 143-F14 (1983)
- Molecular Emission Which Is Probably Localized within the Central 10 Parsecs of the Galaxy. *Y. Fukui, H. Ogawa, and S. Deguchi*. **275**, L55, 148-C9 (1983)
- A Catalog of High Accuracy Circular Polarization Measurements. *Kurt W. Weiler and Imke de Pater*. **52**, 293, 13-D12 (1983) (Abstr. in **269**, 808, 75-C7)
- A Catalog of Dwarf-Galaxies in Virgo. *Gibson Reaves*. **53**, 375, 21-F12 (1983) (Abstr. in **272**, 786, 110-C11)
- Galaxies: Photometry**
- A Search for Globular Clusters around the Edge-on Spiral Galaxy NGC 55. *William Liller and Gonzalo Alcaíno*. **264**, 53, 1-E2 (1983)
- CCD Photometry of Abell Clusters. I. Magnitudes and Redshifts for 84 Brightest Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel*. **264**, 337, 6-A5 (1983)
- A Search for Globular Clusters around the Edge-on Late-Type Spiral Galaxy NGC 253. *William Liller and Gonzalo Alcaíno*. **265**, 166, 13-G9 (1983)
- The Nature of the Cluster Surrounding 3C 295. *Sidney van den Bergh*. **265**, 606, 19-B14 (1983)
- Infrared Mapping and *UBVRi* Photometry of the Spiral Galaxy NGC 1566. *John A. Hackwell and François Schweizer*. **265**, 643, 19-E11 (1983)
- Infrared Photometry of the Halo of M87. *Stephen P. Boughn and Peter R. Saulson*. **265**, L55, 26-B12 (1983)
- CCD Photometry of the Center of M31. *Stephen M. Kent*. **266**, 562, 34-D5 (1983)
- The Ages of the Disks of S0 Galaxies. *Nelson Caldwell*. **268**, 90, 52-G11 (1983)
- The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. I. The Basic Scale Factors of the Galaxy and Two Kinematic Tests of the Long and Short Distance Scales. *G. de Vaucouleurs*. **268**, 451, 58-A5 (1983)
- The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. II. Comparisons of Metric and Photometric Scale Lengths and Three Further Tests of the Long and Short Distance Scales. *G. de Vaucouleurs*. **268**, 468, 58-B8 (1983)
- CCD Photometry of Abell Clusters. II. Surface Photometry of 249 Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel*. **268**, 476, 58-C2 (1983)
- Redshift Modifications to HEAO A-1 Cluster X-Ray Luminosities. *M. P. Kowalski, M. P. Ulmer, and R. G. Cruddace*. **268**, 540, 59-A1 (1983)
- Blue Compact Dwarf Galaxies. II. Near-Infrared Studies and Stellar Populations. *Trinh X. Thuan*. **268**, 667, 60-D11 (1983)
- NGC 1275: A Burgeoning Elliptical Galaxy. *A. Wirth, S. J. Kenyon, and D. A. Hunter*. **269**, 102, 66-A13 (1983)
- 2-165 keV Observations of Active Galaxies and the Diffuse Background. *R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson*. **269**, 423, 71-B2 (1983)
- Stellar Populations in Local Group Dwarf Elliptical Galaxies. I. NGC 147. *J. R. Mould, Jerome Kristian, and G. S. Da Costa*. **270**, 471, 83-C10 (1983)
- Photometry of Resolved Galaxies. III. GR 8. *J. G. Hoessel and G. E. Danielson*. **271**, 65, 88-E14 (1983)
- The Magellanic Irregular Galaxy DDO 155. *G. de Vaucouleurs and C. Moss*. **271**, 123, 89-C7 (1983)
- The Rate of Star Formation in Normal Disk Galaxies. *Robert C. Kennicutt, Jr.* **272**, 54, 101-E13 (1983)
- X-Ray, Optical, and Radio Observations of the Blue Galaxy Butcher-Oemler 6 in the 3C 295 Cluster. *J. Patrick Henry, John T. Clarke, Stuart Bowyer, and Russell J. Lavery*. **272**, 434, 106-D14 (1983)
- Multicolor Surface Photometry of Markarian Seyfert Galaxies. *H. K. C. Yee*. **272**, 473, 107-A6 (1983)
- Spectral Evolution of Galaxies. I. Early-Type Systems. *Gustavo Bruzual A.* **273**, 105, 113-C6 (1983)
- The Carina Dwarf Spheroidal—An Intermediate Age Galaxy. *Jeremy Mould and Marc Aaronson*. **273**, 530, 119-C14 (1983)
- Luminosity Distributions for Virgo Cluster Galaxies. I. Near-Infrared Surface Photometry of 81 Disk Systems. *Todd A. Boroson, Karen M. Strom, and Stephen E. Strom*. **274**, 39, 124-D2 (1983)
- Brightest Members of Rich and Poor Clusters of Galaxies. I. Surface Brightness Profiles of cD Type Galaxies. *Christopher Morbey and Stephen Morris*. **274**, 502, 130-E9 (1983)
- Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith*. **274**, 571, 131-E1 (1983)
- Photometry of Resolved Galaxies. II. Sextans A. *J. G. Hoessel, R. A. Schommer, and G. E. Danielson*. **274**, 577, 131-E8 (1983)
- A Global Value of the Hubble Constant. *N. Visvanathan*. **275**, 430, 142-C2 (1983)
- Photoelectric *UBV* Surface Photometry of NGC 205. *Jill S. Price and Gary L. Grasdale*. **275**, 559, 143-F1 (1983)
- The Case Low-Dispersion Northern Sky Survey. I. *Peter Pesch*

**Galaxies: Photometry—Continued**

and N. Sanduleak. **51**, 171, 3-D1 (1983) (Abstr. in **263**, 1006, 142-F7)

The Evolution of Galaxies in Clusters. III. Photometry of 17 Intermediate Redshift Clusters. *Harvey Butcher, Augustus Oemler, and Donald C. Wells*. **52**, 183, 12-A2 (1983) (Abstr. in **269**, 809, 75-C8)

A Near-Infrared and Optical Study of X-Ray Selected Seyfert Galaxies. I. Observations. *Christopher W. McAlary, R. A. McLaren, R. J. McGonegal, and J. Maza*. **52**, 341, 15-A8 (1983) (Abstr. in **270**, 779, 86-E6)

Luminosity Distribution in Galaxies. II. A Study of Accidental and Systematic Errors with Application to NGC 3379. *M. Capaccioli and G. de Vaucouleurs*. **52**, 465, 16-E10 (1983) (Abstr. in **270**, 781, 86-E8)

A Study of Low Surface Brightness Spiral Galaxies. II. Optical Surface Photometry, Infrared Photometry, and H II Region Spectrophotometry. *W. Romanishin, K. M. Strom, and S. E. Strom*. **53**, 105, 18-A10 (1983) (Abstr. in **271**, 892, 99-B14)

Spectral Evolution of Galaxies. III. Cosmological Predictions for the Space Telescope Faint Object Camera. *Gustavo Bruzual A.* **53**, 497, 23-E2 (1983) (Abstr. in **272**, 787, 110-C12)

**Galaxies: Redshifts**

Galaxy Clusters with Multiple Components. II. Abell 115. *Timothy C. Beers, John P. Huchra, and Margaret J. Geller*. **264**, 356, 6-B12 (1983)

A Distance Scale from the Infrared Magnitude/H I Velocity-Width Relation. IV. The Morphological Type Dependence and Scatter in the Relation; the Distances to Nearby Groups. *Marc Aaronson and Jeremy Mould*. **265**, 1, 12-A6 (1983)

The H I Distribution in an Extremely Faint Dwarf Irregular Galaxy M81 dwA. *W. L. W. Sargent, R. Sancisi, and K. Y. Lo*. **265**, 711, 20-D14 (1983)

Spectroscopy of the Fuzz Associated with Four Quasars. *Bruce Balick and T. M. Heckman*. **265**, L1, 18-D14 (1983)

Confirmation of the Luminous Connection between NGC 4319 and Markarian 205. *Jack W. Sulentic*. **265**, L49, 26-B2 (1983)

Markarian Galaxies and Voids in the Galaxy Distribution. *Laird A. Thompson*. **266**, 446, 33-B12 (1983)

Paired Quasars near NGC 2639: Evidence for Quasars in Superclusters? *Holland Ford, Robin Ciardullo, and Richard Harms*. **266**, 451, 33-C4 (1983)

A Survey of Galaxy Redshifts. V. The Two-Point Position and Velocity Correlations. *Marc Davis and P. J. E. Peebles*. **267**, 465, 46-A5 (1983)

Detection of 21 Centimeter Absorption at  $Z \approx 1.94$  in the QSO PKS 1157+014: Erratum. *A. M. Wolfe, F. H. Briggs, and D. L. Jauncey*. **267**, 891, 50-D13 (1983) (Orig. paper in **248**, 460, 86-F1)

The Cancer Cluster: An Unbound Collection of Groups. *Gregory D. Bothun, Margaret J. Geller, Timothy C. Beers, and John P. Huchra*. **268**, 47, 52-D10 (1983)

Redshift Quantization in Compact Groups of Galaxies. *W. J. Cocke and W. G. Tifft*. **268**, 56, 52-E5 (1983)

Redshift Modifications to HEAO A-1 Cluster X-Ray Luminosities. *M. P. Kowalski, M. P. Ulmer, and R. G. Cruddace*. **268**, 540, 59-A1 (1983)

Spectroscopy of Galaxies in Distant Clusters. II. The Population of the 3C 295 Cluster. *Alan Dressler and James E. Gunn*. **270**, 7, 77-A12 (1983)

The Variations of Radio Luminosity with Epoch and Its Effect on the Angular Diameter-Redshift Relation. *Lesley I. Onuora and S. E. Okoye*. **270**, 360, 82-A14 (1983)

On the Density of Galaxy Quartets and the Statistical Likelihood of Discordant Redshift Groups. *Jack W. Sulentic*. **270**, 417, 82-F5 (1983)

The Noninteracting Spiral Pair, NGC 450/UGC 807. *Vera C. Rubin and W. Kent Ford, Jr.* **271**, 556, 95-E5 (1983)

The Space Density and Spectroscopic Properties of a New

Sample of Emission-Line Galaxies. *Anthony J. Wasilewski*. **272**, 68, 101-F13 (1983)

Redshifts of Groups and Clusters in the Rich Superclusters 1451+22 and 1615+43. *Robin Ciardullo, Holland Ford, Frank Bartko, and Richard Harms*. **273**, 24, 112-C10 (1983)

Spectra of Seyfert Galaxies and Seyfert Galaxy Candidates. *Donald E. Osterbrock and Oved Dahari*. **273**, 478, 118-F14 (1983)

The Clustering of Galaxies in a Complete Redshift Survey. *T. Shanks, A. J. Bean, G. Efsthathiou, R. S. Ellis, R. Fong, and B. A. Peterson*. **274**, 529, 130-G8 (1983)

A Global Value of the Hubble Constant. *N. Visvanathan*. **275**, 430, 142-C2 (1983)

Neutral Hydrogen in Isolated Galaxies. III. The Redshift Distribution. *Martha P. Haynes and Riccardo Giovanelli*. **275**, 472, 142-F3 (1983)

The Most Luminous Quasar: S5 0014+81. *Helmut Kühr, James W. Liebert, Peter A. Strittmatter, Gary D. Schmidt, and Craig Mackay*. **275**, L33, 148-B1 (1983)

Inner Ring Structures in Galaxies as Distance Indicators. III. Distances to 453 Spiral and Lenticular Galaxies. *R. Buta and G. de Vaucouleurs*. **51**, 149, 3-A1 (1983) (Abstr. in **263**, 1005, 142-F6)

A Survey of Galaxy Redshifts. IV. The Data. *John Huchra, Marc Davis, David Latham, and John Tonry*. **52**, 39, 10-D11 (1983) (Abstr. in **268**, 906, 63-A9)

Groups of Galaxies. III. The CFA Survey. *M. J. Geller and J. P. Huchra*. **52**, 61, 10-A2 (1983) (Abstr. in **268**, 906, 63-A9)

**Galaxies: Seyfert**

The Absence of Rapid X-Ray Variability in Active Galaxies. *Allyn F. Tennant and R. F. Mushotzky*. **264**, 92, 2-A1 (1983)

Are There Any Shock-heated Galaxies? *Gary J. Ferland and Hagai Netzer*. **264**, 105, 2-B1 (1983)

The Reddening of Active Galactic Nuclei. *Matthew A. Malkan*. **264**, L1, 5-A2 (1983)

The Nuclear Radio Source of the X-Ray Galaxy NGC 2110. *James S. Ulvestad and Andrew S. Wilson*. **264**, L7, 5-A8 (1983)

Theoretical Quasar Emission-Line Profiles. I. Curve-of-Growth Effects on Observed Profiles. *E. N. Hubbard and R. C. Puetter*. **265**, 35, 12-D10 (1983)

IUE Observations of Markarian 3 and 6: Reddening and the Nonstellar Continuum. *Matthew A. Malkan and J. B. Oke*. **265**, 92, 13-B1 (1983)

Prominent Ultraviolet Emission Lines from Type 1 Seyfert Galaxies. *Chi-Chao Wu, Albert Boggess, and Theodore R. Gull*. **266**, 28, 27-C5 (1983)

Why Are Broad Emission Lines Seen in Seyfert Galaxies and Not in BL Lacertae Objects? *P. W. Guilbert, A. C. Fabian, and Richard McCray*. **266**, 466, 33-D6 (1983)

The Polarization of Seyfert Galaxies. *P. G. Martin, I. B. Thompson, J. Maza, and J. R. P. Angel*. **266**, 470, 33-D10 (1983)

Toward Explaining Seyfert Galaxies. *Daniel W. Weedman*. **266**, 479, 33-E5 (1983)

Nearby Galaxies with Seyfert-like Nuclei. *M. M. Phillips, P. A. Charles, and J. A. Baldwin*. **266**, 485, 33-E11 (1983)

The Ultraviolet Spectrum of the Seyfert Galaxies NGC 3516 and NGC 5548. *M. H. Ulrich and C. Boisson*. **267**, 515, 46-D13 (1983)

H I Observations of the High-Velocity System in NGC 1275. *J. H. van Gorkom and R. D. Ekers*. **267**, 528, 46-E12 (1983)

Anomalous Radio Continuum Features in Edge-on Spiral Galaxies. *E. Hummel, J. H. van Gorkom, and C. G. Kotanyi*. **267**, L5, 45-B6 (1983)

The Strength of Paschen-Alpha in the Seyfert 1.9 Galaxy V Zwicky 317. *Richard J. Rudy and S. P. Willner*. **267**, L69, 51-A4 (1983)



- Spatially Extended Narrow Emission-Line Gas in the Seyfert Galaxy NGC 4151. *Timothy M. Heckman and Bruce Balick.* **268**, 102, 53-A9 (1983)
- Extended Soft X-Ray Emission from NGC 4151. *Martin Elvis, Ulrich G. Briel, and J. Patrick Henry.* **268**, 105, 53-A13 (1983)
- Monte Carlo Simulations of the Evolution of Galactic Nuclei Containing Massive, Central Black Holes. *Martin J. Duncan and Stuart L. Shapiro.* **268**, 565, 59-C1 (1983)
- The Ultraviolet Excess of Luminous Quasars. II. Evidence for Massive Accretion Disks. *Matthew A. Malkan.* **268**, 582, 59-D4 (1983)
- Reddening Indicators for Quasars and Seyfert 1 Galaxies. *Steven A. Grandi.* **268**, 591, 59-D13 (1983)
- Star-Burst Galactic Nuclei. *Vicki A. Balzano.* **268**, 602, 59-E10 (1983)
- Mrk 744 and Mrk 1066: Two Seyfert Galaxies with Strong Absorption-Line Spectra. *Robert W. Goodrich and Donald E. Osterbrock.* **269**, 416, 71-A9 (1983)
- 2-165 keV Observations of Active Galaxies and the Diffuse Background. *R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson.* **269**, 423, 71-B2 (1983)
- Morphology of Optical Forms of N Galaxies. *W. W. Morgan and Richard D. Dreiser.* **269**, 438, 71-C3 (1983)
- Rapid X-Ray Variability from the Seyfert 1 Galaxy NGC 4051. *F. E. Marshall, S. S. Holt, R. F. Mushotzky, and R. H. Becker.* **269**, L31, 76-A7 (1983)
- Low-Ionization Active Galactic Nuclei: X-Ray or Shock Heated? *J. P. Halpern and J. E. Steiner.* **269**, L37, 76-A12 (1983)
- The Effects of Seeing on Spectral Line Measurements in Seyfert 1 Galaxies. *Bradley M. Peterson and George W. Collins II.* **270**, 71, 77-F8 (1983)
- The Distribution of Molecular Clouds in the Nuclear Region of NGC 1068. *N. Z. Scoville, Judith S. Young, and L. B. Lucy.* **270**, 443, 83-A10 (1983)
- Arp 102B: A New and Unusual Broad-Line Galaxy. *John Stauffer, Rudolph Schild, and William Keel.* **270**, 465, 83-C3 (1983)
- Optical Polarimetry of Broad-Line Radio Galaxies. *Richard J. Rudy, G. D. Schmidt, H. S. Stockman, and Richard L. Moore.* **271**, 59, 88-E8 (1983)
- Compton Heated Winds and Coronae above Accretion Disks. I. Dynamics. *Mitchell C. Begelman, Christopher F. McKee, and Gregory A. Shields.* **271**, 70, 88-F9 (1983)
- Compton Heated Winds and Coronae above Accretion Disks. II. Radiative Transfer and Observable Consequences. *Mitchell C. Begelman and Christopher F. McKee.* **271**, 89, 89-A1 (1983)
- VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. *Isabella M. Gioia, E. D. Feigelson, T. Maccaracaro, R. Schild, and G. Zamorani.* **271**, 524, 95-C1 (1983)
- Time Development of the Emission Lines and Continuum of NGC 4151. *Robert R. J. Antonucci and Ross D. Cohen.* **271**, 564, 95-E14 (1983)
- Evidence for a Highly Polarized Continuum in the Nucleus of NGC 1068. *Joseph S. Miller and Robert R. J. Antonucci.* **271**, L7, 93-A8 (1983)
- The Space Density and Spectroscopic Properties of a New Sample of Emission-Line Galaxies. *Anthony J. Wasilewski.* **272**, 68, 101-F13 (1983)
- Reverse Stellar Evolution, Stellar Ablation, and the Origin of Gas in Quasars. *William G. Mathews.* **272**, 390, 106-A12 (1983)
- X-Ray, Optical, and Radio Observations of the Blue Galaxy Butcher-Oemler 6 in the 3C 295 Cluster. *J. Patrick Henry, John T. Clarke, Stuart Bowyer, and Russell J. Lavery.* **272**, 434, 106-D14 (1983)
- Multicolor Surface Photometry of Markarian Seyfert Galaxies. *H. K. C. Yee.* **272**, 473, 107-A6 (1983)
- Theoretical Quasar Emission-Line Profiles. II. Effects of Source Function Variation and Total Thickness. *R. C. Puetter and E. N. Hubbard.* **273**, 36, 112-E2 (1983)
- Spectra of Seyfert Galaxies and Seyfert Galaxy Candidates. *Donald E. Osterbrock and Oved Dahari.* **273**, 478, 118-F14 (1983)
- The Narrow-Line Region of Intermediate Seyfert Galaxies. *Ross D. Cohen.* **273**, 489, 119-A1 (1983)
- Upper Limits to O III  $\lambda$ 5592 and [N II]  $\lambda$ 6594 in Seyfert Galaxies. *Donald E. Osterbrock, Oved Dahari, and Jan Olof Ekberg.* **273**, L31, 117-D3 (1983)
- Broad-Line Kinematic Models and the Forbidden Line Emission in Quasars and Seyfert Galaxies. *T. J. Carroll and John Kwan.* **274**, 113, 125-B7 (1983)
- Outflow of Gas in the Seyfert 1 Galaxy Markarian 509. *M. M. Phillips, J. A. Baldwin, Bruce Atwood, and R. F. Carswell.* **274**, 558, 131-D1 (1983)
- Far-Infrared Observations of the Type 1 Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith.* **274**, 571, 131-E1 (1983)
- Radio Jets and High-Velocity Gas in the Seyfert Galaxy NGC 1068. *A. S. Wilson and J. S. Ulvestad.* **275**, 8, 137-A14 (1983)
- Broad Emission Features in QSOs and Active Galactic Nuclei. I. New Calculations of Fe II Line Strengths. *Hagai Netzer and Beverley J. Willis.* **275**, 445, 142-D4 (1983)
- The Stellar and Nonstellar Continua of Seyfert Galaxies: Non-thermal Emission in the Near-Infrared. *Matthew A. Malkan and Alexei V. Filippenko.* **275**, 477, 142-F8 (1983)
- The Case Low-Dispersion Northern Sky Survey. I. *Peter Pesch and N. Sanduleak.* **51**, 171, 3-D1 (1983) (Abstr. in **263**, 1006, 142-F7)
- An H $\alpha$  [N II] Survey of the Nuclei of a Complete Sample of Spiral Galaxies. *William Keel.* **52**, 229, 12-F8 (1983) (Abstr. in **269**, 810, 75-C9)
- A Near-Infrared and Optical Study of X-Ray Selected Seyfert Galaxies. I. Observations. *Christopher W. McAlary, R. A. McLaren, R. J. McGonegal, and J. Maza.* **52**, 341, 15-A8 (1983) (Abstr. in **270**, 779, 86-E6)
- Galaxies: Stellar Content**
- Carbon Stars in Local Group Galaxies. *Harvey B. Richer and Bengt E. Westerlund.* **264**, 114, 2-B10 (1983)
- M Supergiants and the Distance to M101. *R. M. Humphreys and S. E. Strom.* **264**, 458, 7-C9 (1983)
- A Search for Globular Clusters around the Edge-on Late-Type Spiral Galaxy NGC 253. *William Liller and Gonzalo Alcaino.* **265**, 166, 13-G9 (1983)
- Studies of Luminous Stars in Nearby Galaxies. VIII. The Small Magellanic Cloud. *Roberta M. Humphreys.* **265**, 176, 14-A5 (1983)
- The Effects of Induced Star Formation on the Evolution of the Galaxy. II. The Galactic Ecosystem. *Steven N. Shore.* **265**, 202, 14-C14 (1983)
- The  $L \propto \sigma^2$  Relation for the Bulge Components of Disk Galaxies. *John Kormendy and Garth Illingworth.* **265**, 632, 19-D13 (1983)
- The Galactic Spheroid. *John N. Bahcall, Maarten Schmidt, and Raymond M. Soneira.* **265**, 730, 20-F6 (1983)
- Long-Period Variables in the Galactic Bulge: Evidence for a Young Super-Metal-rich Population. *P. R. Wood and M. S. Bessell.* **265**, 748, 21-A1 (1983)
- Spectroscopy of the Fuzz Associated with Four Quasars. *Bruce Balick and T. M. Heckman.* **265**, L1, 18-D14 (1983)
- Infrared Photometry of the Halo of M87. *Stephen P. Boughn and Peter R. Saulson.* **265**, L55, 26-B12 (1983)
- Photometric Studies of Composite Stellar Systems. V. Infrared Photometry of Star Clusters in the Magellanic Clouds. *S. E. Persson, M. Aaronson, Judith G. Cohen, Jay A. Frogel, and*

**Galaxies: Stellar Content—Continued**

- K. Matthews. **266**, 105, 28-B2 (1983)
- Toward Explaining Seyfert Galaxies. Daniel W. Weedman. **266**, 479, 33-E5 (1983)
- Three-Dimensional Computer Simulations of Star Formation in Dwarf Galaxies. Neil F. Comins. **266**, 543, 34-B14 (1983)
- Star Formation in the Semistellar Nucleus of M33. Robert W. O'Connell. **267**, 80, 40-G7 (1983)
- Carbon Stars and the Seven Dwarfs. Marc Aaronson, Edward W. Olszewski, and Paul W. Hodge. **267**, 271, 42-G5 (1983)
- The Ages of the Disks of S0 Galaxies. Nelson Caldwell. **268**, 90, 52-G11 (1983)
- Blue Compact Dwarf Galaxies. II. Near-Infrared Studies and Stellar Populations. Trinh X. Thuan. **268**, 667, 60-D11 (1983)
- NGC 1275: A Burgeoning Elliptical Galaxy. A. Wirth, S. J. Kenyon, and D. A. Hunter. **269**, 102, 66-A13 (1983)
- The Soft X-Ray Diffuse Background. D. McCammon, D. N. Burrows, W. T. Sanders, and W. L. Kraushaar. **269**, 107, 66-B4 (1983)
- The Brightest Stars as Extragalactic Distance Indicators. Roberta M. Humphreys. **269**, 335, 70-A5 (1983)
- A Multifrequency Study of Star Formation in the Blue Compact Dwarf Galaxy I Zw 36. F. Viallefond and Trinh X. Thuan. **269**, 444, 71-C11 (1983)
- Spectroscopy of Galaxies in Distant Clusters. II. The Population of the 3C 295 Cluster. Alan Dressler and James E. Gunn. **270**, 7, 77-A12 (1983)
- A Modification of the Newtonian Dynamics: Implications for Galaxies. M. Milgrom. **270**, 371, 82-B11 (1983)
- Stellar Populations in Local Group Dwarf Elliptical Galaxies. I. NGC 147. J. R. Mould, Jerome Kristian, and G. S. Da Costa. **270**, 471, 83-C10 (1983)
- Dynamics of the Stellar Component of the Bulge of M31. Douglas B. McElroy. **270**, 485, 83-D12 (1983)
- Photometry of Resolved Galaxies. III. GR 8. J. G. Hoessel and G. E. Danielson. **271**, 65, 88-E14 (1983)
- The Chemical Inhomogeneity of the Sculptor Dwarf Spheroidal Galaxy. Graeme H. Smith and Michael A. Dopita. **271**, 113, 89-B11 (1983)
- The Rate of Star Formation in Normal Disk Galaxies. Robert C. Kennicutt, Jr. **272**, 54, 101-E13 (1983)
- A Comment on Red Supergiant Variables in the SMC. Jay A. Frogel. **272**, 116, 102-C11 (1983)
- Globular Cluster Systems in the Hydra I Elliptical Galaxies. II. William E. Harris, Malcolm G. Smith, and Eric S. Myra. **272**, 456, 106-F13 (1983)
- Multicolor Surface Photometry of Markarian Seyfert Galaxies. H. K. C. Yee. **272**, 473, 107-A6 (1983)
- Spectrophotometry of 12 Metal-poor Galaxies: Implications for the Primordial Helium Abundance. Daniel Kunth and Wallace L. W. Sargent. **273**, 81, 113-A7 (1983)
- Spectral Evolution of Galaxies. I. Early-Type Systems. Gustavo Bruzual A. **273**, 105, 113-C6 (1983)
- The Chemical Composition of Distant Globular Clusters: Are There Any Metal-poor Clusters? Catherine A. Pilachowski, Gregory D. Bothun, Edward W. Olszewski, and Andrew Odell. **273**, 187, 114-C5 (1983)
- The Carina Dwarf Spheroidal—An Intermediate Age Galaxy. Jeremy Mould and Marc Aaronson. **273**, 530, 119-C14 (1983)
- Wolf-Rayet Stars in the Local Group Galaxies M31 and NGC 6822. Anthony F. J. Moffat and Michael M. Shara. **273**, 544, 119-E3 (1983)
- Wolf-Rayet Stars in M33. Philip Massey and Peter S. Conti. **273**, 576, 119-G8 (1983)
- Luminosity Distributions for Virgo Cluster Galaxies. I. Near-Infrared Surface Photometry of 81 Disk Systems. Todd A. Boroson, Karen M. Strom, and Stephen E. Strom. **274**, 39, 124-D2 (1983)
- Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson. **274**, 125, 125-C5 (1983)
- Gas Kinematics and the Structures of Extragalactic Giant and Supergiant H II Regions. J. S. Gallagher and Deidre A. Hunter. **274**, 141, 125-D7 (1983)
- An Infrared Search for Very Low Mass Stars: The Luminosity Function. Ronald G. Probst. **274**, 237, 126-D5 (1983)
- Photometry of Resolved Galaxies. II. Sextans A. J. G. Hoessel, R. A. Schommer, and G. E. Danielson. **274**, 577, 131-E8 (1983)
- Metal Content of K Giants in the Nuclear Bulge of the Galaxy. A. E. Whitford and R. M. Rich. **274**, 723, 133-C8 (1983)
- An Infrared Search for Luminous Stars in the Bar West Field of the Large Magellanic Cloud. Jay A. Frogel and Harvey B. Richer. **275**, 84, 138-A1 (1983)
- The Stellar and Nonstellar Continua of Seyfert Galaxies: Non-thermal Emission in the Near-Infrared. Matthew A. Malkan and Alexei V. Filippenko. **275**, 477, 142-F8 (1983)
- Photoelectric UVB Surface Photometry of NGC 205. Jill S. Price and Gary L. Grasdalen. **275**, 559, 143-F1 (1983)
- The Stellar Component of the Galaxy as Seen by the AFGL Infrared Sky Survey. Gary L. Grasdalen, R. D. Gehrz, J. A. Hackwell, M. Castelaz, and C. Gullixson. **53**, 413, 22-B7 (1983) (Abstr. in **272**, 787, 110-C12)
- Strong Radio Sources in Bright Spiral Galaxies. III. Disk Emission. J. J. Condon. **53**, 459, 23-A1 (1983) (Abstr. in **272**, 787, 110-C12)

**Galaxies: Structure**

- Relaxation and Tidal Stripping in Rich Clusters of Galaxies. I. Evolution of the Mass Distribution. David Merritt. **264**, 24, 1-C1 (1983)
- Massive Neutrinos in Large-Scale Gravitational Clustering. Adrian L. Melott. **264**, 59, 1-E7 (1983)
- Preferred Orbit Planes in the Gravitational Field of a Tumbling Spheroidal Galaxy. Richard H. Durisen, Joel E. Tohline, Joseph A. Burns, and Anthony R. Dobrovolskis. **264**, 392, 6-E9 (1983)
- The Rotation of Elliptical Galaxies: An Application of the Theory of Tidal Torques. George Lake. **264**, 408, 6-F11 (1983)
- On the Global Density Waves in Self-gravitating Flat Disks. Ashok Ambastha and Ram K. Varma. **264**, 413, 6-G2 (1983)
- A Simple Theory of How Spiral Galaxies Acquire Their Principal Global Properties. David Burstein and Craig L. Sarazin. **264**, 427, 7-A6 (1983)
- Gravitationally Induced Spurs in Spiral Galaxies: An Example in M31. Gene G. Byrd. **264**, 464, 7-D4 (1983)
- A Distance Scale from the Infrared Magnitude/H I Velocity-Width Relation. IV. The Morphological Type Dependence and Scatter in the Relation; the Distances to Nearby Groups. Marc Aaronson and Jeremy Mould. **265**, 1, 12-A6 (1983)
- The X-Ray Morphology of Abell 1367. J. Bechtold, W. Forman, R. Giacconi, C. Jones, J. Schwarz, W. Tucker, and L. Van Speybroeck. **265**, 26, 12-C7 (1983)
- Radio Structure and Optical Kinematics of the cD Galaxy Hydra A (3C 218). R. D. Ekers and S. M. Simkin. **265**, 85, 13-A5 (1983)
- Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney. **265**, 107, 13-C2 (1983)
- The Spatial Distribution of H II Regions in NGC 4321. Scott Anderson, Paul Hodge, and Robert C. Kennicutt, Jr. **265**, 132, 13-E2 (1983)
- Time Evolution of Disk Galaxies Undergoing Stochastic Self-propagating Star Formation. Wendy L. Freedman and Barry F. Madore. **265**, 140, 13-E11 (1983)
- Absorption of Halo Gas in the Direction of M13. Klaas S. de Boer and Blair D. Savage. **265**, 210, 14-D8 (1983)

- Hierarchical Merging and the Structure of Elliptical Galaxies. *Rida T. Farouki, Stuart L. Shapiro, and Martin J. Duncan.* **265**, 597, 19-B5 (1983)
- On the Origin of Relativistic Particles and Gamma-Rays in Quasars. *R. J. Protheroe and D. Kazanas.* **265**, 620, 19-D1 (1983)
- The  $L \propto \sigma^4$  Relation for the Bulge Components of Disk Galaxies. *John Kormendy and Garth Illingworth.* **265**, 632, 19-D13 (1983)
- Infrared Mapping and *UBVRi* Photometry of the Spiral Galaxy NGC 1566. *John A. Hackwell and François Schweizer.* **265**, 643, 19-E11 (1983)
- A Clamshell for Blandford-Rees Jets. *Vincent Icke.* **265**, 648, 19-F4 (1983)
- Rotational Velocities and Central Velocity Dispersions for a Sample of S0 Galaxies. *Alan Dressler and Allan Sandage.* **265**, 664, 19-G6 (1983)
- Optical Emission in the Radio Lobes of Radio Galaxies. II. New Observations of 25 Radio Lobes. *Philippe Crane, J. Anthony Tyson, and William C. Saslaw.* **265**, 681, 20-B3 (1983)
- The Long Term Evolution of Rotating Stellar Bars. *P. Carnevali.* **265**, 701, 20-D4 (1983)
- The H I Distribution in an Extremely Faint Dwarf Irregular Galaxy M81 dwA. *W. L. W. Sargent, R. Sancisi, and K. Y. Lo.* **265**, 711, 20-D14 (1983)
- A Bisymmetric Spiral Magnetic Field and the Spiral Arms in Our Galaxy. *Y. Sofue and M. Fujimoto.* **265**, 722, 20-E12 (1983)
- The Galactic Spheroid. *John N. Bahcall, Maarten Schmidt, and Raymond M. Soneira.* **265**, 730, 20-F6 (1983)
- Infrared Photometry of the Halo of M87. *Stephen P. Boughn and Peter R. Saulson.* **265**, L55, 26-B12 (1983)
- Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups, Clusters, the Hercules Supercluster, and the Value of the Hubble Constant. *R. Buta and G. de Vaucouleurs.* **266**, 1, 27-A6 (1983)
- The Kinematic Properties of Faint Elliptical Galaxies. *Roger L. Davies, George Efsthathiou, S. Michael Fall, Garth Illingworth, and Paul L. Schechter.* **266**, 41, 27-D4 (1983)
- Anisotropic Velocity Dispersions in Spherical Galaxies. *John L. Tonry.* **266**, 58, 27-E7 (1983)
- Infrared Observations of the Jet in M87. *R. M. Smith, G. V. Bicknell, A. R. Hyland, and T. J. Jones.* **266**, 69, 27-F4 (1983)
- The Reconfinement of Jets. *Robert H. Sanders.* **266**, 73, 27-F8 (1983)
- Dynamics of Yet More Ellipticals and Bulges. *Roger L. Davies and Garth Illingworth.* **266**, 516, 34-A1 (1983)
- The Role of the Gas in Propagating Star Formation. *Philip E. Seiden.* **266**, 555, 34-C12 (1983)
- Is There Nonluminous Matter in Dwarf Spheroidal Galaxies? *S. M. Faber and D. N. C. Lin.* **266**, L17, 32-B3 (1983)
- Some Implications of Nonluminous Matter in Dwarf Spheroidal Galaxies. *D. N. C. Lin and S. M. Faber.* **266**, L21, 32-B7 (1983)
- VLBI Observations of the Nucleus of Centaurus A. *Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Barry, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **266**, L93, 39-B8 (1983)
- CO Emission and the Optical Disk in the Giant Sc Galaxy M101. *P. M. Solomon, J. Barrett, D. B. Sanders, and R. de Zafra.* **266**, L103, 39-C3 (1983)
- Flocculent and Grand Design Spiral Galaxies in Groups: Time Scales for the Persistence of Grand Design Spiral Structures. *Bruce G. Elmegreen and Debra Meloy Elmegreen.* **267**, 31, 40-C8 (1983)
- The Ratio of the Unseen Halo Mass to the Luminous Disk Mass in NGC 891. *John N. Bahcall.* **267**, 52, 40-E7 (1983)
- One-dimensional Periodic Flows with a Shock Transition: Application to the Density Wave Theory of Spiral Structure. *T. J. Bogdan.* **267**, 109, 41-B8 (1983)
- Further Evidence for M87's Massive, Dark Halo. *D. Fabricant and P. Gorenstein.* **267**, 535, 46-F5 (1983)
- Thermal Conduction and Heating by Nonthermal Electrons in the X-Ray Halo of M87. *Wallace H. Tucker and Robert Rosner.* **267**, 547, 46-G3 (1983)
- The Radial Distribution of H II Regions in Spiral Galaxies. *P. W. Hodge and R. C. Kennicutt, Jr.* **267**, 563, 47-A5 (1983)
- Stellar Orbits in a Triaxial Galaxy. I. Orbits in the Plane of Rotation. *Tim de Zeeuw and David Merritt.* **267**, 571, 47-A13 (1983)
- Orbital Configurations for Gas in Elliptical Galaxies. *David Merritt and Tim de Zeeuw.* **267**, L19, 45-C9 (1983)
- The Incidence of 21 Centimeter Absorption in QSO Redshift Systems Selected for Mg II Absorption: Evidence for a Two-Phase Nature of the Absorbing Gas. *F. H. Briggs and A. M. Wolfe.* **268**, 76, 52-F11 (1983)
- Spatially Extended Narrow Emission-Line Gas in the Seyfert Galaxy NGC 4151. *Timothy M. Heckman and Bruce Balick.* **268**, 102, 53-A9 (1983)
- The Galactic Gamma-Ray Source Population. *C. P. Godfrey.* **268**, 111, 53-B5 (1983)
- The Galaxy as Fundamental Calibrator of the Extragalactic Distance Scale. I. The Basic Scale Factors of the Galaxy and Two Kinematic Tests of the Long and Short Distance Scales. *G. de Vaucouleurs.* **268**, 451, 58-A5 (1983)
- CCD Photometry of Abell Clusters. II. Surface Photometry of 249 Cluster Galaxies. *Donald P. Schneider, James E. Gunn, and John G. Hoessel.* **268**, 476, 58-C2 (1983)
- Effects of Galaxy Collisions on the Structure and Evolution of Galaxy Clusters. I. Mass and Luminosity Functions and Background Light. *Glenn E. Miller.* **268**, 495, 58-D9 (1983)
- Enhanced Radio Emission in Merging Galaxies. *Timothy M. Heckman.* **268**, 628, 59-G11 (1983)
- The Distribution of Ionized Gas in the Nuclei of Spiral Galaxies. *William C. Keel.* **268**, 632, 60-A1 (1983)
- Estimating the Tumble Rates of Galaxy Halos. *Gregory F. Simonson and Joel E. Tohline.* **268**, 638, 60-B10 (1983)
- On the Equilibrium Configurations of Prolate, Axisymmetric Stellar Systems. *Courtlandt L. Bohn.* **268**, 646, 60-C4 (1983)
- Interstellar H $\alpha$  Emission along the Galactic Equator. *R. J. Reynolds.* **268**, 698, 60-G1 (1983)
- Dwarf Elliptical Galaxies. *Humberto Gerola, Paolo Carnevali, and E. E. Salpeter.* **268**, L75, 63-E6 (1983)
- Pressure Collimation of Supersonic Radio Jets. *Arno Krautter, R. N. Henriksen, and Kayll Lake.* **269**, 81, 65-G6 (1983)
- Effects of the Kelvin-Helmholtz Surface Instability on Supersonic Jets. *Philip E. Hardee.* **269**, 94, 66-A5 (1983)
- A Statistical VLBI Study of Milli-Arcsecond Cores in Extragalactic Radio Sources. *Robert A. Preston, David D. Morabito, and David L. Jauncey.* **269**, 387, 70-F8 (1983)
- Morphology of Optical Forms of N Galaxies. *W. W. Morgan and Richard D. Dreiser.* **269**, 438, 71-C3 (1983)
- The Transitory Nature of the Filaments in NGC 5128 (Centaurus A). *J. A. Graham.* **269**, 440, 71-C7 (1983)
- The Stability of a Magnetically Confined Radio Jet. *Haldan Cohn.* **269**, 500, 72-A1 (1983)
- Can Secondary Infall Produce Flat Rotation Curves? *Carlton Pryor and Myron Lecar.* **269**, 513, 72-A14 (1983)
- Radio Continuum Observations of the Bar of NGC 1097. *Marc P. Ondrechen and J. M. van der Hulst.* **269**, L47, 76-B7 (1983)
- Stellar and Gaseous Dynamics of Triaxial Galaxies. *George Lake and Colin Norman.* **270**, 51, 77-E2 (1983)
- Stochastic Self-propagating Star Formation in Three-dimensional Disk Galaxy Simulations. *Thomas Staller, Neil Comins, and Bruce F. Smith.* **270**, 79, 77-G3 (1983)
- A Modification of the Newtonian Dynamics: Implications for Galaxies. *M. Milgrom.* **270**, 371, 82-B11 (1983)

**Galaxies: Structure—Continued**

- Scalloped Disk Galaxies: A Kelvin-Helmholtz Instability? *Robert C. Fleck, Jr.* **270**, 507, 83-F8 (1983)
- Simulations of Galaxy Mergers: Cannibalism and Dynamical Friction. *Martin J. Duncan, Rida T. Farouki, and Stuart L. Shapiro.* **271**, 22, 88-B13 (1983)
- The Magellanic Irregular Galaxy DDO 155. *G. de Vaucouleurs and C. Moss.* **271**, 123, 89-C7 (1983)
- Alignment of Faint Galaxy Images: Cosmological Distortion and Rotation. *F. Valdes, J. A. Tyson, and J. F. Jarvis.* **271**, 431, 94-B5 (1983)
- Does the Association of Quasars with Galaxies Depend on the Morphological Type of Galaxy? *Yaoquan Chu and Xingfen Zhu.* **271**, 507, 95-A12 (1983)
- cD Galaxy Dynamics and An Aged Ridge (Jet) in 3C 338. *Jack O. Burns, Erik Schwendeman, and Richard A. White.* **271**, 575, 95-G2 (1983)
- The Riemann Disks. I. Equilibrium and Secular Evolution. *Martin D. Weinberg and Scott Tremaine.* **271**, 586, 96-A1 (1983)
- The Riemann Disks. II. Stability. *Martin D. Weinberg.* **271**, 595, 96-A10 (1983)
- Spiral Gravitational Potentials and the Mass Growth of Molecular Clouds. *John Kwan and Francisco Valdes.* **271**, 604, 96-B5 (1983)
- The Rate of Star Formation in Normal Disk Galaxies. *Robert C. Kennicutt, Jr.* **272**, 54, 101-E13 (1983)
- Inner Ring Structures in Galaxies as Distance Indicators. IV. Distances to Several Groups, Clusters, the Hercules Supercluster, and the Value of the Hubble Constant: Erratum. *R. Buta and G. de Vaucouleurs.* **272**, 380, 105-B7 (1983) (Orig. paper in **266**, 1, 27-A6)
- The Kinematics of Globular Clusters in the Large Magellanic Cloud. *K. C. Freeman, Garth Illingworth, and Augustus Oemler, Jr.* **272**, 488, 107-B7 (1983)
- Neutral Interstellar Gas in the Lower Galactic Halo. *C. E. Albert.* **272**, 509, 107-C14 (1983)
- Shell Structure in NGC 5128. *D. F. Malin, P. J. Quinn, and J. A. Graham.* **272**, L5, 105-D6 (1983)
- The Inner Radio Structure of Centaurus A: Clues to the Origin of the Jet X-Ray Emission. *Jack O. Burns, Eric D. Feigelson, and Ethan J. Schreier.* **273**, 128, 113-E6 (1983)
- The Discovery of Optical Emission Knots in the Inner Jet of Centaurus A. *Jean Brodie, Ariele Königl, and Stuart Bowyer.* **273**, 154, 113-G7 (1983)
- MCG 5-29-86: A Galaxy with a Prolate Central Bulge? *Ken-ichi Wakamatsu and Halton C. Arp.* **273**, 167, 114-A8 (1983)
- Some Current Trends in Milky Way Research. *Bart J. Bok.* **273**, 411, 118-A5 (1983)
- Radio Emission and the Masses of Elliptical Galaxies. *Timothy M. Heckman.* **273**, 505, 119-B3 (1983)
- On the Oscillations and the Stability of Stellar Systems. *Peter O. Vandervoort.* **273**, 511, 119-B9 (1983)
- VLA Radio Continuum Observations of the Edge-on Spiral Galaxy NGC 3079. *Nebojsa Duric, E. R. Seaquist, Patrick C. Crane, R. C. Bignell, and L. E. Davis.* **273**, L11, 117-B12 (1983)
- Luminosity Distributions for Virgo Cluster Galaxies. I. Near-Infrared Surface Photometry of 81 Disk Systems. *Todd A. Boroson, Karen M. Strom, and Stephen E. Strom.* **274**, 39, 124-D2 (1983)
- Interstellar Absorption Lines in the Spectrum of 3C 273. *D. G. York, C. C. Wu, S. Ratcliff, J. C. Blades, L. L. Cowie, and D. C. Morton.* **274**, 136, 125-D2 (1983)
- The Environment of D and cD Galaxies. *Timothy C. Beers and Margaret J. Geller.* **274**, 491, 130-D11 (1983)
- The Intrinsic Shape of cD Galaxies. *Christ Ftaclas and Mitchell F. Struble.* **274**, 521, 130-F14 (1983)
- A Catalog of Elliptical Galaxies with Shells. *D. F. Malin and D. Carter.* **274**, 534, 131-A1 (1983)
- Galaxy Content of Selected Southern Groups: Elliptical Galaxies at Low Density. *Allan Wirth.* **274**, 541, 131-B3 (1983)
- The Vertical Growth and Structure of Galactic Disks. *Jens Verner Villumsen.* **274**, 632, 132-C11 (1983)
- Diameter versus Surface Brightness Diagram of Galaxies. *K. Kodaira, S. Okamura, and M. Watanabe.* **274**, L49, 136-A4 (1983)
- Radio and Optical Observations of the Alleged Optical Jet in DA 240. *Wil van Breugel, Timothy Heckman, Alan Bridle, Harvey Butcher, Richard Strom, and Bruce Balick.* **275**, 61, 137-E11 (1983)
- Bifurcations, Gaps, and Stochasticity in Barred Galaxies. *G. Contopoulos.* **275**, 511, 143-B3 (1983)
- The Stellar Kinematics and Dynamics of Barred Galaxies. I. NGC 936. *John Kormendy.* **275**, 529, 143-C7 (1983)
- Inner Ring Structures in Galaxies as Distance Indicators. III. Distances to 453 Spiral and Lenticular Galaxies. *R. Buta and G. de Vaucouleurs.* **51**, 149, 3-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- A Near-Infrared and Optical Study of X-Ray Selected Seyfert Galaxies. I. Observations. *Christopher W. McAlary, R. A. McLaren, R. J. McGonegal, and J. Maza.* **52**, 341, 15-A8 (1983) (Abstr. in **270**, 779, 86-E6)
- Felcity Fields in Late-Type Galaxies from H $\alpha$  Fabry-Perot Interferometry. IV. Kinematics and Dynamics of the SAB(s)c Spiral NGC 5236 (M83). *G. de Vaucouleurs, W. D. Pence, and E. Davoust.* **53**, 17, 17-B6 (1983) (Abstr. in **271**, 889, 99-B11)
- A Catalog of Dwarf-Galaxies in Virgo. *Gibson Reaves.* **53**, 375, 21-F12 (1983) (Abstr. in **272**, 786, 110-C11)
- Strong Radio Sources in Bright Spiral Galaxies. III. Disk Emission. *J. J. Condon.* **53**, 459, 23-A1 (1983) (Abstr. in **272**, 787, 110-C12)
- AB Stars in the Southern Galactic Halo. II. Spectroscopy and Radial Velocities. *Jeffrey R. Pier.* **53**, 791, 27-E2 (1983) (Abstr. in **274**, 922, 135-E3)
- Galaxy, The: see Galaxies: Milky Way**
- Gamma-Rays: Bursts**
- On the Nature of Two Gamma Bursts with Spectral Evolutions Observed by the KONUS Experiment. *E. P. Liang.* **268**, L89, 63-F5 (1983)
- H0547-14: X-Ray Flux from a Weak Gamma-Ray Burst? *C. Ambruster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman.* **269**, 779, 75-A6 (1983)
- Observations of Two Gamma-Ray Bursts by Vela X-Ray Detectors: Erratum. *J. Terrell, E. E. Fenimore, R. W. Klebesadel, and U. D. Desai.* **269**, 806, 75-C5 (1983) (Orig. paper in **254**, 279, 29-A12)
- Optical Candidates for the 1978 November 19 Gamma-Ray Burst Source. *H. Pedersen, C. Motch, M. Tarengi, J. Danziger, G. Pizzichini, and W. H. G. Lewin.* **270**, L43, 87-A14 (1983)
- Candidates for a Gamma-Ray Burster Optical Counterpart. *Bradley E. Schaefer, Patrick Seitzer, and Hale V. Bradt.* **270**, L49, 87-B8 (1983)
- Analysis of the Konus Catalog of Gamma-Ray Bursts with the Thermal Synchrotron Model. *E. P. Liang, T. E. Jernigan, and R. Rodrigues.* **271**, 766, 97-G5 (1983)
- An Optical Test for the Distance of Gamma-Ray Burst Sources. *Mark C. Jennings.* **273**, 309, 115-E11 (1983)
- Optical Radiation Associated with Gamma-Ray Bursts. *Richard A. London and Lynn R. Cominsky.* **275**, L59, 148-C14 (1983)
- Gamma-Rays: General**
- The Propagation of Energetic Ions in Magnetic Loops and Gamma-Ray Emission from Solar Flares. *Ellen G. Zweibel and Deborah A. Haber.* **264**, 648, 9-D2 (1983)



- On the Origin of Relativistic Particles and Gamma-Rays in Quasars. *R. J. Protheroe and D. Kazanas*. **265**, 620, 19-D1 (1983)
- Gamma-Ray Astronomy and the Local Interstellar Medium. *F. Lebrun and J. A. Paul*. **266**, 276, 30-A1 (1983)
- High-Resolution Radio and X-Ray Observations of the Supernova Remnant W28. *M. D. Andrews, J. P. Basart, R. C. Lamb, and R. H. Becker*. **266**, 684, 35-F8 (1983)
- The Galactic Gamma-Ray Source Population. *C. P. Godfrey*. **268**, 111, 53-B5 (1983)
- Detection of  $2 \times 10^{15}$  to  $2 \times 10^{16}$  eV Gamma-Rays from Cygnus X-3. *M. Samorski and W. Stamm*. **268**, L17, 57-B8 (1983)
- Einstein Observations of the Rho Ophiuchi Dark Cloud: An X-Ray Christmas Tree. *Thierry Montmerle, Lydie Koch-Miramond, Edith Falgarone, and Jonathan E. Grindlay*. **269**, 182, 67-A11 (1983)
- The Pulse Profile of the Crab Pulsar in the Energy Range 45 keV–1.2 MeV. *R. B. Wilson and G. J. Fishman*. **269**, 273, 68-B8 (1983)
- The Thermal Pair Annihilation Spectrum: A Detailed Balance Approach. *Roland Svensson*. **270**, 300, 80-B11 (1983)
- Measurements of Galactic Plane Gamma-Ray Emission in the Energy Range 10–80 MeV. *D. L. Bertsch and D. A. Kniffen*. **270**, 305, 80-C2 (1983)
- Gamma-Rays and the Production of Energetic Electrons in Enshrouding Material: A Model for the Quiescent Radio Emission from Cygnus X-3. *W. Thomas Vestrand*. **271**, 304, 91-C9 (1983)
- The High-Energy Spectrum of Hot Accretion Disks. *Jean A. Eilek and Minas Kafatos*. **271**, 804, 98-C5 (1983)
- Discovery of a Redshift  $z = 1.2$  Quasar with a Flat Radio Spectrum in the Field of the Gamma-Ray Source CG 195+04. *A. F. J. Moffat, R. Schlickeiser, M. M. Shara, W. Sieber, R. Tuffs, and H. Kühr*. **271**, L45, 100-A4 (1983)
- Analysis Methods for Results in Gamma-Ray Astronomy. *Ti-pei Li and Yu-qian Ma*. **272**, 317, 104-D6 (1983)
- Blast Waves with Cosmic-Ray Pressure. *Roger A. Chevalier*. **272**, 765, 110-B3 (1983)
- An Identification for "Geminga" (2CG 195+04) 1E 0630+178: A Unique Object in the Error Box of the High-Energy Gamma-Ray Source. *G. F. Bignami, P. A. Caraveo, and R. C. Lamb*. **272**, L9, 105-D13 (1983)
- Gamma-Ray Observational Constraints on the Origin of the Optical Continuum Emission from the White-Light Flare of 1980 July 1. *J. M. Ryan, E. L. Chupp, D. J. Forrest, S. M. Matz, E. Rieger, C. Reppin, G. Kanbach, and G. H. Share*. **272**, L61, 111-B8 (1983)
- Search for Pulsed Gamma-Ray Emission at MeV Energies from 24 Radio Pulsars. *U. Graser and V. Schönfelder*. **273**, 681, 121-A13 (1983)
- Implications of High-Energy Neutron Observations from Solar Flares. *R. Ramaty, R. J. Murphy, B. Kozlovsky, and R. E. Lingenfelter*. **273**, L41, 117-D12 (1983)
- The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35$  c. *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Jostes, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming*. **273**, L65, 123-B3 (1983)
- Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Bucccheri, P. A. Caraveo, M. Gotwald, W. Hersens, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills*. **274**, 231, 126-C13 (1983)
- Gamma-Ray Observations toward NGC 1275, and the Origin of the Emission in the Infrared, X-Rays, and Gamma-Rays. *A. W. Strong and G. F. Bignami*. **274**, 549, 131-C6 (1983)
- A Thermal Interpretation of the X-Ray Spectra of Quasars, Active Galactic Nuclei, and Cygnus X-1. *P. Mészáros*. **274**, L13, 129-A12 (1983)
- Galactic Absorption of High-Energy Gamma-Rays from Cygnus X-3. *Robert J. Gould*. **274**, L23, 129-B7 (1983)
- The State of Cygnus X-1. *J. C. Ling, W. A. Mahoney, W. A. Wheaton, A. S. Jacobson, and L. Kaluzienski*. **275**, 307, 140-D1 (1983)
- Gas Dynamics: see Hydrodynamics**
- Gravitation**
- Relativistic Tidal Forces. *Kenneth Nordtvedt*. **264**, 620, 9-B2 (1983)
- An Upper Limit on the Stochastic Background of Ultralow-Frequency Gravitational Waves. *R. W. Romani and J. H. Taylor*. **265**, L35, 26-A4 (1983)
- Upper Limits on the Isotropic Gravitational Radiation Background from Pulsar Timing Analysis. *R. W. Hellings and G. S. Downs*. **265**, L39, 26-A7 (1983)
- On Axisymmetric Perturbations of Some Rotating Stars. *William A. Hiscock*. **266**, 248, 29-E13 (1983)
- The Statistics of Gravitational Lenses: Apparent Changes in the Luminosity Function of Distant Sources Due to Passage of Light through a Single Galaxy. *Mario Vietri and Jeremiah P. Ostriker*. **267**, 488, 46-B14 (1983)
- Stellar Collapses in the Galaxy. *John N. Bahcall and Tsvi Piran*. **267**, L77, 51-A11 (1983)
- The Minimum Period and the Gap in Periods of Cataclysmic Binaries. *Bohdan Paczyński and Ryszard Sienkiewicz*. **268**, 825, 62-B7 (1983)
- Gravitational Radiation from Particles Falling along the Symmetry Axis into a Kerr Black Hole: The Momentum Radiated. *Takashi Nakamura and Mark P. Haugan*. **269**, 292, 68-C14 (1983)
- Image Distortion by Gravitational Lensing. *Thomas W. Noonan*. **270**, 245, 79-E10 (1983)
- The Caustics of Gravitational "Lenses". *Hans C. Ohanian*. **271**, 551, 95-D14 (1983)
- Expected Number of Multiple QSOs from Galaxy and QSO Surface Density Data. *J. A. Tyson*. **272**, L41, 111-A4 (1983)
- The  $V/V_m$  Test in Hoyle-Narlikar Conformal Gravity. *V. K. Kulkarni and D. G. Banhatti*. **274**, 469, 130-C3 (1983)
- Hot Spots on Neutron Stars: The Near-Field Gravitational Lens. *K. R. Pechenick, C. Ftaclas, and J. M. Cohen*. **274**, 846, 134-E8 (1983)
- Tidal Gravitational Radiation from Homogeneous Stars. *Clifford M. Will*. **274**, 858, 134-F6 (1983)
- Equilibrium Configurations of Neutron Stars and the Parametrized Post-Newtonian Metric Theories of Gravitation. *Ignazio Ciufolini and Remo Ruffini*. **275**, 867, 147-A10 (1983)
- Hydrodynamics**
- Meridional Circulation of Rotating Stars. IV. The Approach to the Mean Steady State in Early-Type Stars. *Jean-Louis Tassoul and Monique Tassoul*. **264**, 298, 4-B3 (1983)
- On the Global Density Waves in Self-gravitating Flat Disks. *Ashok Ambastha and Ram K. Varma*. **264**, 413, 6-G2 (1983)
- Magnetohydrodynamic Shock Waves in Molecular Clouds. *B. T. Draine, W. G. Roberge, and A. Dalgarno*. **264**, 485, 7-E11 (1983)
- The Shape of Cooling Filaments in Old Supernova Remnants. *M. D. Smith and J. R. Dickel*. **265**, 272, 15-B4 (1983)
- The Eddington Limit and Supercritical Accretion. II. Time-dependent Calculations. *H. L. Burger and J. I. Katz*. **265**, 393, 16-D3 (1983)
- The Development of Structure in Shearing, Viscous Media. II. James H. Hunter, Jr. and Tomas Horak. **265**, 402, 16-D12 (1983)
- Another Self-similar Blast Wave: Early Time Asymptote with Shock-heated Electrons and High Thermal Conductivity. *Donald P. Cox and Richard J. Edgar*. **265**, 443, 16-G11 (1983)

**Hydrodynamics—Continued**

- Flare Loop Radiative Hydrodynamics. I. Basic Methods. A. N. McClymont and Richard C. Canfield. **265**, 483, 17-C9 (1983)
- Flare Loop Radiative Hydrodynamics. II. Thermal Stability of Empirical Models. A. N. McClymont and Richard C. Canfield. **265**, 497, 17-D9 (1983)
- Flare Loop Radiative Hydrodynamics. III. Nonlocal Radiative Transfer Effects. Richard C. Canfield, George H. Fisher, and A. N. McClymont. **265**, 507, 17-E5 (1983)
- A Clamshell for Blandford-Rees Jets. Vincent Icke. **265**, 648, 19-F4 (1983)
- Numerical Simulations of Loops Heated to Solar Flare Temperatures. I. Gasdynamics. Chung-Chieh Cheng, E. S. Oran, G. A. Doschek, J. P. Boris, and J. T. Mariska. **265**, 1090, 24-F4 (1983)
- The Reconfinement of Jets. Robert H. Sanders. **266**, 73, 27-F8 (1983)
- Comments on the Dynamical Effects of Radiative Viscosity. Dimitri Mihalas. **266**, 242, 29-E7 (1983)
- Normal Modes of Relaxation in Stellar Systems: Dynamical Friction and Thermalization. David Layzer. **266**, 831, 37-D8 (1983)
- One-dimensional Periodic Flows with a Shock Transition: Application to the Density Wave Theory of Spiral Structure. T. J. Bogdan. **267**, 109, 41-B8 (1983)
- Meridional Circulation in Rotating Stars. V. Cooling White Dwarfs. Monique Tassoul and Jean-Louis Tassoul. **267**, 334, 43-E2 (1983)
- QUIPS: Time-dependent Properties of Quasi-invariant Self-gravitating Polytropes. A. Munier and M. R. Feix. **267**, 344, 43-E12 (1983)
- Necessary Conditions for the Stability of Rotating Newtonian Stellar Models. Lee Lindblom. **267**, 402, 44-B14 (1983)
- Flare Loop Radiative Hydrodynamics. IV. Dynamic Evolution of Unstable Semiempirical Loop Models. Chang-Hyuk An, Richard C. Canfield, George H. Fisher, and A. N. McClymont. **267**, 421, 44-D5 (1983)
- Thermal Conduction and Heating by Nonthermal Electrons in the X-Ray Halo of M87. Wallace H. Tucker and Robert Rosner. **267**, 547, 46-G3 (1983)
- The Equilibria of Rotating, Isothermal Clouds. I. Method of Solution. Steven W. Stahler. **268**, 155, 53-F5 (1983)
- The Equilibria of Rotating, Isothermal Clouds. II. Structure and Dynamical Stability. Steven W. Stahler. **268**, 165, 53-G1 (1983)
- A Two-dimensional Supernova Model with Rotation and Nuclear Burning. Peter Bodenheimer and S. E. Woosley. **269**, 281, 68-C3 (1983)
- The Infall of a Star into a Massive Black Hole. R. A. Nolthenius and J. I. Katz. **269**, 297, 68-D5 (1983)
- Level Surface Approach for Uniformly Rotating, Axisymmetric Polytropes. G. P. Horedt. **269**, 303, 68-D11 (1983)
- Simulation Models for the Evolution of Cloud Systems. I. Introduction and Preliminary Simulations. William A. Pumphrey and John M. Scalzo. **269**, 531, 72-C4 (1983)
- Beam Models for Radio Sources. IV. Improved Jet Collimation. M. Javad Siah and Paul J. Wiita. **270**, 427, 82-G1 (1983)
- Self-similar Solutions for the Interaction Regions of Colliding Winds. Roger A. Chevalier and James N. Imamura. **270**, 554, 84-B13 (1983)
- Compton Heated Winds and Coronae above Accretion Disks. I. Dynamics. Mitchell C. Begelman, Christopher F. McKee, and Gregory A. Shields. **271**, 70, 88-F9 (1983)
- Meridional Circulation in Rotating Stars. VI. The Effects of Anisotropic Eddy Viscosity. Monique Tassoul and Jean-Louis Tassoul. **271**, 315, 91-D6 (1983)
- The Riemann Disks. I. Equilibrium and Secular Evolution. Martin D. Weinberg and Scott Tremaine. **271**, 586, 96-A1 (1983)
- The Riemann Disks. II. Stability. Martin D. Weinberg. **271**, 595, 96-A10 (1983)
- HYDRA: An Implicit Partial Differential Equation, Relaxation, Stability Analysis Package. R. F. Stellingwerf. **271**, 876, 99-A12 (1983)
- Star Formation within OB Subgroups: Implosion by Multiple Sources. Richard I. Klein, Maxwell T. Sandford II, and Rodney W. Whitaker. **271**, L69, 100-B12 (1983)
- Viscous Drag on an Accretion Disk due to an Embedded Stellar System. Jeremiah P. Ostriker. **273**, 99, 113-B14 (1983)
- Semianalytical Treatment of the Hydrodynamics of Supernova Remnants during the Snowplow Phase. Bernard Gaffet. **273**, 267, 115-B11 (1983)
- Temperature-Grid Coordinates for Treating Pulsations in the Hydrogen Ionization Zone. Toshiki Aikawa and Norman R. Simon. **273**, 346, 116-A11 (1983)
- On the Propagation of Acoustic Waves in a Radiating Fluid. Dimitri Mihalas and Barbara Weibel Mihalas. **273**, 355, 116-B6 (1983)
- On Tidal Detonation of Stars by Massive Black Holes. G. V. Bicknell and R. A. Gingold. **273**, 749, 121-F13 (1983)
- The Dynamic and Gravitational Instabilities of Spherical Shocks. Ethan T. Vishniac. **274**, 152, 125-E4 (1983)
- Large-Amplitude Spherically Symmetric Perturbations in the Early Universe. I. The Initial Data. Comer Duncan. **275**, 35, 137-C13 (1983)
- On the Fission Theory of Binary Stars. III. The Formulation of the Bifurcation Problem. N. R. Lebovitz. **275**, 316, 140-D10 (1983)

**Hydromagnetics**

- The Relation between Magnetic Field and Gas Density in Interstellar Clouds. Robert L. Brown and Chong-An Chang. **264**, 134, 2-D2 (1983)
- On Scaling the Magnetic Field Strength in Interstellar Clouds: Resolution of the "B versus n Dilemma". Robert C. Fleck, Jr. **264**, 139, 2-D7 (1983)
- MHD Stability of Incompressible Coronal Loops with Radiative Energy Loss. Chang-Hyuk An. **264**, 302, 4-B7 (1983)
- Diamagnetic Force on a Flux Tube. Tyan Yeh. **264**, 630, 9-B12 (1983)
- Magnetic Neutral Sheets in Evolving Fields. I. General Theory. E. N. Parker. **264**, 635, 9-C3 (1983)
- Magnetic Neutral Sheets in Evolving Fields. II. Formation of the Solar Corona. E. N. Parker. **264**, 642, 9-C10 (1983)
- The Thermonuclear Model for X-Ray Transients: Erratum. R. K. Wallace, S. E. Woosley, and Thomas A. Weaver. **264**, 746, 10-D10 (1983) (Orig. paper in **258**, 696, 81-A1)
- Large-Amplitude Hydromagnetic Waves in Collisionless Relativistic Plasma: Exact Solution for the Fast-Mode Magnetoacoustic Wave. Aaron Barnes. **265**, 457, 17-A11 (1983)
- Ejection of Magnetic Fields from the Sun: Acceleration of a Solar Wind Containing Diamagnetic Plasmoids. G. W. Pneuman. **265**, 468, 17-B8 (1983)
- Doubly Diffusive Magnetic Buoyancy Instability in the Solar Interior. J. H. M. M. Schmitt and R. Rosner. **265**, 901, 22-F4 (1983)
- Radiative or Two-Stream Instability as a Source for Pulsar Radio Emission. E. Asséo, R. Pellat, and H. Sol. **266**, 201, 29-B8 (1983)
- Pair Creation above Pulsar Polar Caps: Geometrical Structure and Energetics of Slot Gaps. Jonathan Arons. **266**, 215, 29-C8 (1983)
- The Heating of Postflare Loops. P. J. Cargill and E. R. Priest. **266**, 383, 31-B1 (1983)
- The Magnetosphere of Uranus: Plasma Sources, Convection, and Field Configuration. G.-H. Voigt, T. W. Hill, and A. J. Dessler. **266**, 390, 31-B8 (1983)
- Closed and Open Magnetic Fields in Stellar Winds. D. J. Mullan and R. S. Steinolfson. **266**, 823, 37-C14 (1983)
- The Structure of Twisted Magnetic Flux Tubes. P. K. Brown-

- ing and E. R. Priest. **266**, 848, 37-E11 (1983)
- Induced Mass and Wave Motions in the Lower Solar Atmosphere. I. Effects of Shear Motion of Flux Tubes. S. T. Wu, Y. Q. Hu, Y. Nakagawa, and E. Tandberg-Hanssen. **266**, 866, 37-G1 (1983)
- Dynamics and Spectroscopy of Asymmetrical Heated Coronal Loops. John T. Mariska and Jay P. Boris. **267**, 404, 44-C7 (1983)
- On the First-Order Smoothing Expression for the  $\alpha$ -Effect in Dynamo Theory. B. R. Durney. **267**, 822, 49-F11 (1983)
- Solar Type II Radio Emission and the Shock Drift Acceleration of Electrons. Gordon D. Holman and M. E. Pesses. **267**, 837, 50-A1 (1983)
- An Attempt to Resolve Pulsar Magnetospheres Using Interstellar Scintillations. J. M. Cordes, J. M. Weisberg, and V. Boriakoff. **268**, 370, 56-A1 (1983)
- Isotopic Anomalies among Solar Energetic Particles: Contribution of Preacceleration in Collapsing Magnetic Neutral Sheets. D. J. Mullan. **268**, 385, 56-B2 (1983)
- Nonlinear Propagation of Hydromagnetic Waves in High-Beta Plasmas. P. K. Shukla. **268**, 396, 56-B13 (1983)
- Magnetohydrostatic Model of Solar Faculae. Vladimir A. Osherovich, T. Flå, and G. A. Chapman. **268**, 412, 56-D3 (1983)
- Dynamic Stabilization of Hydromagnetic Surface Waves: Applications to Cometary Plasma Tails. B. Buti. **268**, 420, 56-D11 (1983)
- Energy Dynamics in Stressed Magnetic Fields: The Filamentation and Flare Instabilities. G. Van Hoven, R. S. Steinolfson, and T. Tachi. **268**, 860, 62-D14 (1983)
- Effects of the Kelvin-Helmholtz Surface Instability on Supersonic Jets. Philip E. Hardee. **269**, 94, 66-A5 (1983)
- The Stability of a Magnetically Confined Radio Jet. Haldan Cohn. **269**, 500, 72-A1 (1983)
- A Rotating Protocluster in W58: HCO<sup>+</sup> Aperture Synthesis Maps. S. N. Vogel and W. J. Welch. **269**, 568, 72-F1 (1983)
- Turbulent Resistive Heating of Solar Coronal Arches. Gregory Benford. **269**, 690, 74-A5 (1983)
- Release of Solar Cosmic Rays from the Corona: Rayleigh-Taylor Instability and Reconnection. D. J. Mullan. **269**, 765, 74-G6 (1983)
- Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner. **270**, 270, 79-G7 (1983)
- Hydromagnetic Wave Dissipation in Molecular Clouds. Ellen G. Zweibel and Karl Josefsson. **270**, 511, 83-F12 (1983)
- Magnetic Bubbles and High-Velocity Outflows in Molecular Clouds. B. T. Draine. **270**, 519, 82-G6 (1983)
- On the Drift Mechanism for Energetic Charged Particles at Shocks. G. M. Webb, W. I. Axford, and T. Terasawa. **270**, 537, 84-A10 (1983)
- Zero-Curvature Friedmann-Robertson-Walker Models as Exact Viscous Magnetohydrodynamic Cosmologies. A. A. Coley and B. O. J. Tupper. **271**, 1, 88-A6 (1983)
- Electrodynamic Coupling in Magnetically Confined X-Ray Plasmas of Astrophysical Origin. James A. Ionson. **271**, 778, 98-A6 (1983)
- Magnetohydrodynamic Stability of Line-tied Coronal Arcades. I. Force-free Magnetic Fields without Embedded Prominences. S. Migliuolo and P. J. Cargill. **271**, 820, 98-D7 (1983)
- A Self-similar Magnetohydrostatic Model of a Quiescent Prominence. Vladimir Osherovich. **271**, 847, 98-F6 (1983)
- Focusing of High-Mach Number Jets by an Ambient Medium. David Eichler. **272**, 48, 101-E7 (1983)
- The Effect of MHD Instabilities on the Flaring of Cometary Plasma Tails. Malcolm B. Niedner, Jr., Alexander I. Ershkovich, and John C. Brandt. **272**, 362, 105-A3 (1983)
- A Dynamical Model of Coronal Loops. Satoshi Hinata. **272**, 715, 109-E9 (1983)
- A Static Model of Chromospheric Heating in Solar Flares. Paul J. Ricchiazzi and Richard C. Canfield. **272**, 739, 109-G5 (1983)
- Ambipolar Diffusion in Self-gravitating Isothermal Layers. Frank H. Shu. **273**, 202, 114-D7 (1983)
- Theoretical Non-Maxwellian Particle Velocity Distribution Functions for Spherically Symmetric Solar Wind-like Plasma Systems and Consequences. Sami Cuerman, Itzhak Weiss, and Murray Dryer. **273**, 363, 116-B14 (1983)
- Gravitational Instability in the Presence of a Magnetic Field in the Expanding Universe. S. Hacyan. **273**, 421, 118-B2 (1983)
- Deceleration of Grand Unified Theory Monopoles in a Plasma. Andrew J. S. Hamilton and Craig L. Sarazin. **274**, 399, 128-B2 (1983)
- The Effect of a Coronal Shock Wave on the Solar Wind Ionization State. S. P. Owocki and A. J. Hundhausen. **274**, 414, 128-C3 (1983)
- Centrifugally Driven Winds from Contracting Molecular Disks. R. E. Pudritz and C. A. Norman. **274**, 677, 132-G4 (1983)
- On the Coronae of Rapidly Rotating Stars. IV. Coronal Activity in F Dwarfs and Implications for the Onset of the Dynamo. F. M. Walter. **274**, 794, 134-A12 (1983)
- Synchronization of Magnetic Stars in Binary Systems. F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb. **274**, L71, 136-B12 (1983)
- The Magnetic Flux Problem and Ambipolar Diffusion during Star Formation: One-dimensional Collapse. I. Formulation of the Problem and Method of Solution. Efthimios V. Paleologou and Telemachos Ch. Mouschovias. **275**, 838, 146-F5 (1983)
- Dynamically Consistent Nonlinear Dynamos Driven by Convection in a Rotating Spherical Shell. II. Dynamos with Cycles and Strong Feedbacks. Peter A. Gilman. **53**, 243, 20-A2 (1983) (Abstr. in **272**, 784, 110-C9)
- Hyperfine Structure**  
Detection of the  $J = 1-0$  Transition of CH<sub>3</sub>CN. Henry E. Matthews and Trevor J. Sears. **267**, L53, 45-E13 (1983)
- HII Regions:** see **Nebulae**
- Image Processing**  
Speckle Image Reconstruction of Solar Features. R. V. Stachnik, P. Nisenson, and R. W. Noyes. **271**, L37, 93-C9 (1983)  
Shell Structure in NGC 5128. D. F. Malin, P. J. Quinn, and J. A. Graham. **272**, L5, 105-D6 (1983)
- Infrared: General**  
Submillimeter Extensions of the Solar Limb Determined from Observations of the Total Eclipse of 1982 July 31. C. Lindsey, E. E. Becklin, J. T. Jefferies, F. Q. Orrall, M. W. Werner, and Ian Gatley. **264**, L25, 5-B9 (1983)  
The Variation of Dust Temperatures in Maffei 2. L. J. Rickard and P. M. Harvey. **268**, L7, 57-A8 (1983)  
The Galaxy's 157 Micron [C II] Emission: Observations by Means of a Spectroscopic Lunar Occultation Technique. Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit. **268**, L99, 63-G14 (1983)  
Luminosity Distributions for Virgo Cluster Galaxies. I. Near-Infrared Surface Photometry of 81 Disk Systems. Todd A. Boroson, Karen M. Strom, and Stephen E. Strom. **274**, 39, 124-D2 (1983)  
Evidence for Two Discrete Epochs of Star Formation in the Large Magellanic Cloud. Jay A. Frogel and V. M. Blanco. **274**, L57, 136-A13 (1983)  
Search for Extragalactic Backgrounds in the Far-Infrared. C. Ceccarelli, G. Dall'Oglio, P. de Bernardis, S. Masi, B. Melchiorri, F. Melchiorri, G. Moreno, and L. Pietranera. **275**, L39, 148-B7 (1983)
- Infrared: Sources**  
The 157 Micron [C II] Emission from NGC 2024: Core and Halo Components. Noel L. Kurtz, Scott D. Smyers, Ray W.

## Infrared: Sources—Continued

- Russell, Martin Harwit, and Gary Melnick. **264**, 538, 8-B11 (1983)
- Infrared Photometry of O Stars. John I. Castor and Theodore Simon. **265**, 304, 15-D9 (1983)
- Simultaneous Visual-Infrared Polarimetry of QSOs. J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti. **265**, 625, 19-D6 (1983)
- Infrared Mapping and UBVR Photometry of the Spiral Galaxy NGC 1566. John A. Hackwell and François Schweizer. **265**, 643, 19-E11 (1983)
- The Polarization of the Infrared Cluster in Orion: The Spatial Distribution of the 3.8 Micron Polarization. Michael W. Werner, Harriet L. Dinerstein, and R. W. Capps. **265**, L13, 18-E10 (1983)
- Infrared Spectroscopy of the Sources in S235 and Its Implication for the Line Excess Problem. Rodger I. Thompson, Harley A. Thronson, Jr., and Bel Campbell. **266**, 614, 35-A6 (1983)
- Infrared Line and Radio Continuum Emission of Circumstellar Ionized Regions. M. Simon, M. Felli, L. Cassar, J. Fischer, and M. Massi. **266**, 623, 35-B1 (1983)
- SiS Maser Emission from IRC +10°216. Christian Henkel, Henry E. Matthews, and Mark Morris. **267**, 184, 42-A1 (1983)
- The Dust around the Carbon Star IRC +10216. M. Jura. **267**, 647, 47-G8 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek. **268**, 68, 52-F3 (1983)
- Stellar Diameter Measurements by Two-Aperture Interferometry in the Infrared. G. P. Di Benedetto and G. Conti. **268**, 309, 55-C10 (1983)
- Star-Burst Galactic Nuclei. Vicki A. Balzano. **268**, 602, 59-E10 (1983)
- Infrared Light Curves of Type I Supernovae. II. Late Stages. J. H. Elias and Jay A. Frogel. **268**, 718, 61-A9 (1983)
- IR Maps of M17 in the [O III] 88 Micron and 52 Micron Lines and [N III] 57 Micron Line Measurements. R. J. Emery, D. A. Naylor, B. Fitton, J. Furniss, R. E. Jennings, and K. J. King. **268**, 721, 61-A12 (1983)
- Infrared Observations of OB Star Formation in NGC 6334. Paul M. Harvey and Ian Gatley. **269**, 613, 73-B5 (1983)
- Infrared Photometry and Mass Loss Rates for Of-Type Stars. Paolo Persi, Marco Ferrari-Toniolo, and Gary L. Grasdale. **269**, 625, 73-C5 (1983)
- The Near-Infrared Cepheid Distance Scale. I. Preliminary Galactic Calibration. R. McGonigal, C. W. McAlary, R. A. McLaren, and B. F. Madore. **269**, 641, 73-D10 (1983)
- Detection of Interstellar NH<sub>3</sub> in the Far-Infrared: Warm and Dense Gas in Orion-KL. C. H. Townes, R. Genzel, Dan M. Watson, and J. W. V. Storey. **269**, L11, 69-A12 (1983)
- The Spectral and Spatial Distribution of Radiation from Eta Carinae. III. A High-Resolution 2.2 Micron Map and Morphological Considerations of the Evolutionary Status. R. M. Mitchell, G. Robinson, A. R. Hyland, and T. J. Jones. **271**, 133, 89-D5 (1983)
- A 10 Micron Survey of Star Formation in Galactic Nuclei: Virgo Spiral Galaxies. N. Z. Scoville, E. E. Becklin, Judith S. Young, and R. W. Capps. **271**, 512, 95-B3 (1983)
- Far-Infrared and Submillimeter Observations of Stellar Radiative and Wind Heating in S140 IRS. P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles. **271**, 625, 96-C13 (1983)
- First Detection of the Ground-State  $J_K = 1_0 \rightarrow 0_0$  Submillimeter Transition of Interstellar Ammonia. Jocelyn Keene, Geoffrey A. Blake, and T. G. Phillips. **271**, L27, 93-B13 (1983)
- Detection of Radio Emission from the Becklin-Neugebauer Object. J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck. **271**, L31, 93-C3 (1983)
- An Infrared and Optical Investigation of Galactic Nuclei with Compact Radio Sources. T. M. Heckman, M. J. Lebofsky, G. H. Rieke, and W. van Breugel. **272**, 400, 106-B8 (1983)
- Herbig-Haro Objects in the Dust Globule ESO 210-6A. J. A. Graham and J. H. Elias. **272**, 615, 108-E2 (1983)
- Millimeter and Submillimeter Observations of 3C 273. P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low. **273**, 58, 112-F10 (1983)
- Infrared Study of the Crab Pulsar: The "Shoulder" Pulse and the 3.45 Micron Pulse Profile. J. Middleditch, C. Pennypacker, and M. S. Burns. **273**, 261, 115-B5 (1983)
- Type II OH/IR Masers. III. The Data Base. Terry J. Jones, A. R. Hyland, and Ian Gatley. **273**, 660, 120-G2 (1983)
- OH/IR Masers. IV. Evolution, Pulsation, and Nature of the Sources. Terry J. Jones, A. R. Hyland, P. R. Wood, and Ian Gatley. **273**, 669, 121-A1 (1983)
- Luminous Molecular Hydrogen Emission in the Galaxy System NGC 3690-IC 694. J. Fischer, M. Simon, J. Benson, and P. M. Solomon. **273**, L27, 117-C13 (1983)
- Submillimeter Observations of W3. D. T. Jaffe, R. H. Hildebrand, Jocelyn Keene, and S. E. Whitcomb. **273**, L89, 123-C11 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Willis, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams. **274**, 168, 125-F6 (1983)
- The Infrared Echo of a Type II Supernova with a Circumstellar Dust Shell: Applications to SN 1979c and SN 1980k. Eliahu Dwek. **274**, 175, 125-F13 (1983)
- An Infrared Search for Very Low Mass Stars: The Luminosity Function. Ronald G. Probst. **274**, 237, 126-D5 (1983)
- OH/IR Stars: Late Stages of Evolution of Intermediate-Mass Stars. Teije de Jong. **274**, 252, 125-E7 (1983)
- Infrared and Optical Pulsations from HZ Herculis and Possible 3.5 Second Infrared Pulsations from 1E 2259+586. J. Middleditch, C. R. Pennypacker, and M. S. Burns. **274**, 313, 127-B14 (1983)
- Gamma-Ray Observations toward NGC 1275, and the Origin of the Emission in the Infrared, X-Rays, and Gamma-Rays. A. W. Strong and G. F. Bignami. **274**, 549, 131-C6 (1983)
- Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith. **274**, 571, 131-E1 (1983)
- Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic. **274**, L43, 129-D3 (1983)
- An Infrared Search for Luminous Stars in the Bar West Field of the Large Magellanic Cloud. Jay A. Frogel and Harvey B. Richer. **275**, 84, 138-A1 (1983)
- The Brighter 94 Micron Sources Observed by the Far-Infrared Sky Survey Experiment. Stephan D. Price, K. Shivanandan,



- Thomas L. Murdock, and Phillip F. Bowers. **275**, 125, 138-D8 (1983)
- An Ionization Gradient across the Front of M17 SW. Daniel F. Lester, Harriet L. Dinerstein, David M. Rank, and Diane H. Wooden. **275**, 130, 138-D13 (1983)
- The Circumstellar and Nebular Environment of the Becklin-Neugebauer Object:  $\lambda = 2-5$  Micron Spectroscopy. N. Scofield, S. G. Kleinmann, D. N. B. Hall, and S. T. Ridgway. **275**, 201, 139-C3 (1983)
- A Near-Infrared and Optical Study of X-Ray Selected Seyfert Galaxies. I. Observations. Christopher W. McAlary, R. A. McLaren, R. J. McGonegal, and J. Maza. **52**, 341, 15-A8 (1983) (Abstr. in **270**, 779, 86-E6)
- An Infrared Search for Very Low Mass Stars: JHK Photometry and Results for Composite Systems. Ronald G. Probst. **53**, 335, 21-D2 (1983) (Abstr. in **272**, 785, 110-C10)
- The Stellar Component of the Galaxy as Seen by the AFGL Infrared Sky Survey. Gary L. Grasdasen, R. D. Gehrz, J. A. Hackwell, M. Castelaz, and C. Gullixson. **53**, 413, 22-B7 (1983) (Abstr. in **272**, 787, 110-C12)
- Predicted Infrared Brightness of Stars within 25 Parsecs of the Sun. Hugh M. Johnson and Christine D. Wright. **53**, 643, 25-D8 (1983) (Abstr. in **273**, 840, 122-F10)
- Infrared Photometry, Bolometric Luminosities, and Effective Temperatures for Giant Stars in 26 Globular Clusters. Jay A. Frogel, S. E. Persson, and Judith G. Cohen. **53**, 713, 26-B9 (1983) (Abstr. in **273**, 841, 122-F11)
- Infrared: Spectra**
- High-Resolution Near-Infrared and Millimeter-Wave Spectroscopy of NGC 7027. Harley A. Thronson, Jr. **264**, 599, 8-G5 (1983)
- Identification of the Emission Features near 3.5 Microns in the Pre-Main-Sequence Star HD 97048. F. Baas, L. J. Allamandola, T. R. Geballe, S. E. Persson, and J. H. Lacy. **265**, 290, 15-C8 (1983)
- Observations of the 145.5 Micron [O I] Emission Line in the Orion Nebula. Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit. **265**, L7, 18-E5 (1983)
- Infrared Observations of the Jet in M87. R. M. Smith, G. V. Bicknell, A. R. Hyland, and T. J. Jones. **266**, 69, 27-F4 (1983)
- Infrared Line and Radio Continuum Emission of Circumstellar Ionized Regions. M. Simon, M. Felli, L. Cassar, J. Fischer, and M. Massi. **266**, 623, 35-B1 (1983)
- The Strength of Paschen-Alpha in the Seyfert 1.9 Galaxy V Zwicky 317. Richard J. Rudy and S. P. Willner. **267**, L69, 51-A4 (1983)
- The NH<sub>3</sub> Spectrum in Saturn's 5 Micron Window. Uwe Fink, Harold P. Larson, Gordon L. Bjoraker, and James R. Johnson. **268**, 880, 62-F5 (1983)
- Diode Laser Heterodyne Observations of Silicon Monoxide in Sunspots: A Test of Three Sunspot Models. D. A. Glenar, D. Deming, D. E. Jennings, T. Kostiuik, and M. J. Mumma. **269**, 309, 68-E4 (1983)
- X-Ray Sources in Molecular Clouds. Stephen Lepp and Richard McCray. **269**, 560, 72-E7 (1983)
- Detection of Interstellar NH<sub>3</sub> in the Far-Infrared: Warm and Dense Gas in Orion-KL. C. H. Townes, R. Genzel, Dan M. Watson, and J. W. V. Storey. **269**, L11, 69-A12 (1983)
- Solar Emission Lines near 12 Microns. J. Brault and R. Noyes. **269**, L61, 76-C5 (1983)
- Determinations of S III, O IV, and Ne V Abundances in Planetary Nebulae from Infrared Lines. M. A. Shure, T. Herter, J. R. Houck, D. A. Briotta, Jr., W. J. Forrest, G. E. Gull, and J. F. McCarthy. **270**, 645, 85-B9 (1983)
- The 0.9-2.5 Micron Spectrum of Comet West 1976 VI. James R. Johnson, Uwe Fink, and Harold P. Larson. **270**, 769, 86-D10 (1983)
- HL Tauri and Its Circumstellar Disk. Martin Cohen. **270**, L69, 87-C14 (1983)
- Infrared Spectra of WN Stars. I. HD 50896. D. J. Hillier, T. J. Jones, and A. R. Hyland. **271**, 221, 90-D9 (1983)
- A Far-Infrared Study of the N/O Abundance Ratio in Galactic H II Regions. Daniel F. Lester, Harriet L. Dinerstein, Michael W. Werner, Dan M. Watson, and Reinhard L. Genzel. **271**, 618, 96-C6 (1983)
- Extended Near-Infrared Emission from Visual Reflection Nebulae. K. Sellgren, M. W. Werner, and Harriet L. Dinerstein. **271**, L13, 93-A13 (1983)
- Near-Infrared Spectrophotometry of Planetary Nebulae. P. D. LeVan and Richard J. Rudy. **272**, 137, 102-E4 (1983)
- Luminous Molecular Hydrogen Emission in the Galaxy System NGC 3690-IC 694. J. Fischer, M. Simon, J. Benson, and P. M. Solomon. **273**, L27, 117-C13 (1983)
- Observations of NGC 7027 from 5.2 to 7.5 Microns: The Detection of Ni II and Additional Dust Features. J. D. Bregman, H. L. Dinerstein, J. H. Goebel, D. F. Lester, F. C. Witteborn, and D. M. Rank. **274**, 666, 132-F7 (1983)
- An Ionization Gradient across the Front of M17 SW. Daniel F. Lester, Harriet L. Dinerstein, David M. Rank, and Diane H. Wooden. **275**, 130, 138-D13 (1983)
- Identification of the Solar Emission Lines near 12 Microns. E. S. Chang and R. W. Noyes. **275**, L11, 141-F11 (1983)
- Instabilities**
- A One-Zone Model for Shell Flashes on Accreting Compact Stars. Bohdan Paczyński. **264**, 282, 4-A1 (1983)
- Pulsation Properties of DA White Dwarfs: Radial Mode Instabilities. H. Saio, D. E. Winget, and E. L. Robinson. **265**, 982, 23-E2 (1983)
- On Axisymmetric Perturbations of Some Rotating Stars. William A. Hiscok. **266**, 248, 29-E13 (1983)
- Necessary Conditions for the Stability of Rotating Newtonian Stellar Models. Lee Lindblom. **267**, 402, 44-B14 (1983)
- Effects of the Kelvin-Helmholtz Surface Instability on Supersonic Jets. Philip E. Hardee. **269**, 94, 66-A5 (1983)
- The Stability of a Magnetically Confined Radio Jet. Haldan Cohn. **269**, 500, 72-A1 (1983)
- Release of Solar Cosmic Rays from the Corona: Rayleigh-Taylor Instability and Reconnection. D. J. Mullan. **269**, 765, 74-G6 (1983)
- Scalloped Disk Galaxies: A Kelvin-Helmholtz Instability? Robert C. Fleck, Jr. **270**, 507, 83-F8 (1983)
- HYDRA: An Implicit Partial Differential Equation, Relaxation, Stability Analysis Package. R. F. Stellingwerf. **271**, 876, 99-A12 (1983)
- Alfvén Wave Collapse and the Stability of a Relativistic Electron Beam in a Magnetized Astrophysical Plasma. Steven R. Spangler and James P. Sheerin. **272**, 273, 104-A3 (1983)
- On the Oscillations and the Stability of Stellar Systems. Peter O. Vandervoort. **273**, 511, 119-B9 (1983)
- The Dynamic and Gravitational Instabilities of Spherical Shocks. Ethan T. Vishniac. **274**, 152, 125-E4 (1983)
- Thermochemical Instabilities in Reacting Gases. I. Plasma of Hydrogen. Miguel H. Ibañez and Antonio Parravano. **275**, 181, 139-A11 (1983)
- Instruments**
- Speckle Image Reconstruction of Solar Features. R. V. Stachnik, P. Nisenson, and R. W. Noyes. **271**, L37, 93-C9 (1983)
- Interferometry**
- Interferometric Observations of Solar Limb Structure at 2.6 Millimeters. P. G. Wannier, G. J. Hurford, and G. A. Seelstad. **264**, 660, 9-D14 (1983)
- The H I Absorption in NGC 5128 (Centaurus A). J. M. van der Hulst, W. F. Golisch, and A. D. Haschick. **264**, L37, 11-A9 (1983)
- Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney. **265**, 107, 13-C2 (1983)
- Ionized Gas in Active Molecular Cloud Cores. John Bally and

## Interferometry—Continued

- Read Predmore. **265**, 778, 21-C3 (1983)
- Observations of H $\alpha$  and Microwave Brightening Caused by a Distant Solar Flare. *M. R. Kundu, D. M. Rust, and M. Bobrowsky.* **265**, 1084, 24-E9 (1983)
- 3C 395—A Quasar with Asymmetrical Radio Structure. *K. J. Johnston, J. H. Spencer, A. Witzel, and E. B. Fomalont.* **265**, L43, 26-A11 (1983)
- Small Rotating Clouds of Stellar Mass in Orion Molecular Cloud 1. *Andrew Harris, C. H. Townes, D. N. Matsakis, and Patrick Palmer.* **265**, L63, 26-C6 (1983)
- The Arc Second Radio Structure of 12 BL Lacertae Objects. *J. S. Ulvestad, K. J. Johnston, and K. W. Weiler.* **266**, 18, 27-B9 (1983)
- Infrared Line and Radio Continuum Emission of Circumstellar Ionized Regions. *M. Simon, M. Felli, L. Cassar, J. Fischer, and M. Massi.* **266**, 623, 35-B1 (1983)
- Atomic Hydrogen Associated with the High-Velocity Flow in NGC 2071. *John Bally and Antony A. Stark.* **266**, L61, 32-D13 (1983)
- VLBI Observations of the Nucleus of Centaurus A. *Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **266**, L93, 39-B8 (1983)
- Very Large Array Observations of Solar Active Regions. III. Multiple Wavelength Observations. *Kenneth R. Lang, Robert F. Willson, and Victor Gaizauskas.* **267**, 455, 44-F12 (1983)
- VLA Observations of the  $^2\pi_{3,2} J = 3/2$  Masers Associated with Orion A. *S. S. Hansen and K. J. Johnston.* **267**, 625, 47-E13 (1983)
- Stellar Diameter Measurements by Two-Aperture Interferometry in the Infrared. *G. P. Di Benedetto and G. Contì.* **268**, 309, 55-C10 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. *Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **268**, L23, 57-B13 (1983)
- The Gas Density and Distribution within 2 Parsecs of the Galactic Center. *Robert L. Brown and K. J. Johnston.* **268**, L85, 63-F1 (1983)
- A Statistical VLBI Study of Milli-Arcsecond Cores in Extragalactic Radio Sources. *Robert A. Preston, David D. Morabito, and David L. Jauncey.* **269**, 387, 70-F8 (1983)
- VLA Observations of a Solar Active Region and Coronal Loops. *D. McDonnell and M. R. Kundu.* **269**, 698, 74-A13 (1983)
- Rectilinear Motions in 3C 345. *M. H. Cohen, S. C. Unwin, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker.* **269**, L1, 69-A3 (1983)
- VLA Observations of the Luminous Supernova Remnant in NGC 4449. *R. C. Bignell and E. R. Seaquist.* **270**, 140, 78-D10 (1983)
- High Angular Resolution Observations of Alpha Orionis with a Rotation Shearing Interferometer. *C. Roddier and F. Roddier.* **270**, L23, 81-B9 (1983)
- VLBI Maps of 3C 147, 3C 286, 3C 380, NRAO 150, CTD 93, and 3C 395 at 2.3 GHz. *R. B. Phillips and D. B. Shaffer.* **271**, 32, 88-C9 (1983)
- VLBI Observations of the Radio Sources 0552+398 and 1848+283: Measurements of the Departure from Equipartition. *Steven R. Spangler, Robert L. Mutel, and John M. Benson.* **271**, 44, 88-D7 (1983)
- Superluminal Motion in the Quasar 3C 345. *S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker.* **271**, 536, 95-C13 (1983)
- Speckle Image Reconstruction of Solar Features. *R. V. Stachnik, P. Nisenson, and R. W. Noyes.* **271**, L37, 93-C9 (1983)
- Speckle Interferometry of IRC +10216 in the Fundamental Vibration-Rotation Lines of CO. *H. M. Dyck, S. Beckwith, and B. Zuckerman.* **271**, L79, 100-C7 (1983)
- VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young.* **272**, 383, 106-A5 (1983)
- VLA Observations of Extragalactic NH $_3$  in IC 342. *Paul T. P. Ho and Robert N. Martin.* **272**, 484, 107-B3 (1983)
- The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\geq 0.35 c$ . *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming.* **273**, L65, 123-B3 (1983)
- A New Distance to Cygnus X-3. *John M. Dickey.* **273**, L71, 123-B8 (1983)
- Circumstellar Envelope Structure of Late-Type Stars. *P. F. Bowers, K. J. Johnston, and J. H. Spencer.* **274**, 733, 133-D4 (1983)
- Observations of the M87 Jet at 15 GHz with 0".12 Resolution. *J. A. Biretta, Frazer N. Owen, and Philip E. Hardee.* **274**, L27, 129-B10 (1983)
- VLBI Observations of the QSO 4C 49.22. *Roger Linfield.* **275**, 461, 142-E6 (1983)
- VLA Observations of the Neutral Hydrogen Content of NGC 185 and NGC 205. *Douglas W. Johnson and S. T. Gottesman.* **275**, 549, 143-D14 (1983)
- Limits to the Rate of Component Separation in Scorpius X-1. *E. B. Fomalont, B. J. Geldzahler, R. M. Hjellming, and C. M. Wade.* **275**, 802, 146-C11 (1983)
- Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, Belva G. Campbell, and Francis C. Fekel.* **51**, 309, 6-F1 (1983) (Abstr. in **265**, 1135, 25-B11)
- Felicity Fields in Late-Type Galaxies from H $\alpha$  Fabry-Perot Interferometry. IV. Kinematics and Dynamics of the SAB(s)c Spiral NGC 5236 (M83). *G. de Vaucouleurs, W. D. Pence, and E. Davoust.* **53**, 17, 17-B6 (1983) (Abstr. in **271**, 889, 99-B11)
- Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, and Belva G. Campbell.* **53**, 241, 19-D4 (1983) (Orig. paper in **51**, 309, 6-F1)
- Interplanetary Medium**
- Effects of Drift on the Transport of Cosmic Rays. VI. A Three-dimensional Model including Diffusion. *J. Kóta and J. R. Jokipii.* **265**, 573, 18-C4 (1983)
- Temporal Variations of Nucleonic Abundances in Solar Flare Energetic Particle Events. I. Well-connected Events. *G. M. Mason, G. Gloeckler, and D. Hovestadt.* **267**, 844, 50-A8 (1983)
- Protons from the Decay of Solar Flare Neutrons. *Paul Evenson, Peter Meyer, and K. Roger Pyle.* **274**, 875, 135-A1 (1983)
- A Quantitative Test of Solar Modulation Theory: The Proton, Helium, and Electron Spectra from 1965 through 1979. *P. Evenson, M. Garcia-Munoz, P. Meyer, K. R. Pyle, and J. A. Simpson.* **275**, L15, 141-F14 (1983)
- Interstellar Abundances**
- The Interstellar Medium near the Sun. III. Detailed Analysis of the Line of Sight to Lambda Scorpii. *Donald G. York.* **264**, 172, 2-F12 (1983)
- Theoretical Oscillator Strengths for 21 Spin-forbidden Lines of C, N, O, Al, and Si: Erratum. *Robert D. Cowan, L. M. Hobbs, and D. G. York.* **265**, 582, 18-C13 (1983) (Orig. paper in **257**, 373, 65-A7)
- Electron and Local Gas Densities in Diffuse Interstellar Clouds from Measurements of Ca I Absorption. *S. R. Federman and L. M. Hobbs.* **265**, 813, 21-E13 (1983)
- Interstellar Absorption toward HD 14633. *L. M. Hobbs.* **265**, 817, 21-F3 (1983)

- The Ionization Equilibrium inside the Rho Ophiuchi Cloud. *Theodore P. Snow*, Jr. **266**, 576, 34-E6 (1983)
- Effects of a Shock on the Molecular Composition of a Diffuse Interstellar Cloud. *George F. Mitchell and Terry J. Deveau*. **266**, 646, 35-C12 (1983)
- Interstellar Abundances of Oxygen and Nitrogen. *D. G. York, L. Spitzer, R. C. Bohlin, J. Hill, E. B. Jenkins, B. D. Savage, and T. P. Snow*. **266**, L55, 32-D8 (1983)
- Further Analysis of the Possible Effects of Isotope-selective Photodissociation on Interstellar Carbon Monoxide. *Y.-H. Chu and W. D. Watson*. **267**, 151, 41-E8 (1983)
- Dependence of Interstellar Depletion on Hydrogen Column Density: Possibilities and Implications. *Shankar P. Tarafdar, Sheo S. Prasad, and Wesley T. Huntress, Jr.* **267**, 156, 41-E13 (1983)
- Structure of Dense Molecular Gas in TMC 1 from Observations of Three Transitions of HC<sub>3</sub>N. *F. Peter Schloerb, Ronald L. Snell, and Judith S. Young*. **267**, 163, 41-F7 (1983)
- Detection of Sulfur in the Galactic Center. *T. Herter, D. A. Briotta, Jr., G. E. Gull, M. A. Shure, and J. R. Houck*. **267**, L37, 45-D13 (1983)
- Copernicus Observations of C I: Pressures and Carbon Abundances in Diffuse Interstellar Clouds. *Edward B. Jenkins, Michael Jura, and Michael Loewenstein*. **270**, 88, 78-A1 (1983)
- The [HCO<sup>+</sup>]/[HOC<sup>+</sup>] Abundance Ratio in Molecular Clouds. *R. C. Woods, C. S. Gudeman, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarson, L.-Å. Nyman, and H. Olofsson*. **270**, 583, 84-D14 (1983)
- Comparisons of C<sup>+</sup> Distributions with New Interstellar Sources of HCO Emission. *J. M. Hollis and E. Churchwell*. **271**, 170, 89-G4 (1983)
- Observationally Determined Fe II Oscillator Strengths. *J. Michael Shull, Michael Van Steenberg, and C. Gregory Seab*. **271**, 408, 92-D4 (1983)
- H I Clouds, H I Spin Temperatures. *Harvey S. Liszt*. **275**, 163, 138-G6 (1983)
- Ion-Molecule Syntheses of Interstellar Molecular Hydrocarbons through C<sub>2</sub>H: Toward Molecular Complexity. *Eric Herbst*. **53**, 41, 17-D3 (1983) (Abstr. in **271**, 890, 99-B12)
- Abundances of Carbon-bearing Diatomic Molecules in Diffuse Interstellar Clouds. *R. L. Dickman, W. B. Somerville, D. C. B. Whittet, D. McNally, and J. C. Blades*. **53**, 55, 17-E2 (1983) (Abstr. in **271**, 891, 99-B13)
- Interstellar: Grains**
- The Diffuse Interstellar Feature at 4430 Å and Interstellar Extinction in the Far-Ultraviolet. *Adolf N. Witt, Ralph C. Bohlin, and Theodore P. Stecher*. **267**, L47, 45-E8 (1983)
- Observation of Ice Mantles toward HD 29647. *J. H. Goebel*. **268**, L41, 57-D4 (1983)
- On the Possibly Low H<sub>2</sub> Formation Rate in Dense Clouds. *Theodore P. Snow*. **269**, L57, 76-C2 (1983)
- Interstellar Photoelectric Absorption Cross Sections, 0.03–10 keV. *Robert Morrison and Dan McCammon*. **270**, 119, 78-C4 (1983)
- A Far-Ultraviolet Extinction Law: What Does It Mean? *J. Mayo Greenberg and Grzegorz Chlewicki*. **272**, 563, 108-A6 (1983)
- The Unique Cometary Nebula Parsamian 13. *Martin Cohen, D. K. Aitkin, P. F. Roche, and P. M. Williams*. **273**, 624, 120-D2 (1983)
- Evidence for X-Ray Scattering by Interstellar Dust. *R. C. Catura*. **275**, 645, 144-E12 (1983)
- Shock Processing of Interstellar Grains. *C. Gregory Seab and J. Michael Shull*. **275**, 652, 144-F5 (1983)
- Interstellar: Magnetic Fields**
- The Relation between Magnetic Field and Gas Density in Interstellar Clouds. *Robert L. Brown and Chong-An Chang*. **264**, 134, 2-D2 (1983)
- On Scaling the Magnetic Field Strength in Interstellar Clouds: Resolution of the "B versus n Dilemma". *Robert C. Fleck, Jr.* **264**, 139, 2-D7 (1983)
- A Bisymmetric Spiral Magnetic Field and the Spiral Arms in Our Galaxy. *Y. Sofue and M. Fujimoto*. **265**, 722, 20-E12 (1983)
- The Polarization of Millimeter-Wave Emission Lines in Dense Interstellar Clouds. *P. G. Wannier, N. Z. Scoville, and R. Barvainis*. **267**, 126, 41-C11 (1983)
- VLA Observations of the <sup>2</sup>π<sub>3/2</sub>J = 3/2 Masers Associated with Orion A. *S. S. Hansen and K. J. Johnston*. **267**, 625, 47-E13 (1983)
- Magnetic Bubbles and High-Velocity Outflows in Molecular Clouds. *B. T. Draine*. **270**, 519, 82-G6 (1983)
- Magnetic Field Structure in the Gum Nebula Area. *J. P. Vallée and R. C. Bignell*. **272**, 131, 102-D12 (1983)
- Polarization of Interstellar Molecular Radiofrequency Absorption Lines. *Nikolaos D. Kylafis and Paul R. Shapiro*. **272**, L35, 105-F12 (1983)
- Deceleration of Grand Unified Theory Monopoles in a Plasma. *Andrew J. S. Hamilton and Craig L. Sarazin*. **274**, 399, 128-B2 (1983)
- Linear Polarization of Interstellar Radio-Frequency Absorption Lines and Magnetic Field Direction. *Nikolaos D. Kylafis*. **275**, 135, 138-E4 (1983)
- The Ambipolar Diffusion Time Scale and the Location of Star Formation in Magnetic Interstellar Gas Clouds. *Eugene Howard Scott*. **275**, 836, 146-F3 (1983)
- The Magnetic Flux Problem and Ambipolar Diffusion during Star Formation: One-dimensional Collapse. I. Formulation of the Problem and Method of Solution. *Efthimios V. Paleologou and Telemachos Ch. Mouschovias*. **275**, 838, 146-F5 (1983)
- Interstellar: Matter**
- Effect of Variable Obscuration on the Clustering of Galaxies. *Michael Seldner and Juan M. Uson*. **264**, 1, 1-A6 (1983)
- Relaxation and Tidal Stripping in Rich Clusters of Galaxies. I. Evolution of the Mass Distribution. *David Merritt*. **264**, 24, 1-C1 (1983)
- On the Possibility of Detecting Very Hot Gas through Absorption-Line Studies. *D. G. York and L. L. Cowie*. **264**, 49, 1-D12 (1983)
- The Interstellar Medium near the Sun. III. Detailed Analysis of the Line of Sight to Lambda Scorpii. *Donald G. York*. **264**, 172, 2-F12 (1983)
- IUE Observations of Markarian 3 and 6: Reddening and the Nonstellar Continuum. *Matthew A. Malkan and J. B. Oke*. **265**, 92, 13-B1 (1983)
- The Wavelength Dependence of Interstellar Polarization in the Large Magellanic Cloud. *Geoffrey C. Clayton, P. G. Martin, and Ian Thompson*. **265**, 194, 14-C3 (1983)
- Absorption of Halo Gas in the Direction of M13. *Klaas S. de Boer and Blair D. Savage*. **265**, 210, 14-D8 (1983)
- The Gas-Grain Interaction in the Interstellar Medium: Thermal Accommodation and Trapping. *John R. Burke and D. J. Hollenbach*. **265**, 223, 14-E7 (1983)
- The H I Distribution in an Extremely Faint Dwarf Irregular Galaxy M81 dwA. *W. L. W. Sargent, R. Sancisi, and K. Y. Lo*. **265**, 711, 20-D14 (1983)
- Extinction to Ionized Gas at the Galactic Center. *S. P. Willner and Judith L. Pipher*. **265**, 760, 21-A13 (1983)
- Electron and Local Gas Densities in Diffuse Interstellar Clouds from Measurements of Ca I Absorption. *S. R. Federman and L. M. Hobbs*. **265**, 813, 21-E13 (1983)
- Observations of the 145.5 Micron [O I] Emission Line in the Orion Nebula. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit*. **265**, L7, 18-E5 (1983)
- The Polarization of the Infrared Cluster in Orion: The Spatial Distribution of the 3.8 Micron Polarization. *Michael W. Werner, Harriet L. Dinerstein, and R. W. Capps*. **265**, L13, 18-

## Interstellar: Matter—Continued

- E10 (1983)
- The Depletion of Calcium in the Rho Ophiuchi Cloud. *Theodore P. Snow, J. G. Timothy, and C. G. Seab.* **265**, L67, 26-C10 (1983)
- Gamma-Ray Astronomy and the Local Interstellar Medium. *F. Lebrun and J. A. Paul.* **266**, 276, 30-A1 (1983)
- The Mass of Tycho's Supernova Remnant as Determined from a High-Resolution X-Ray Map. *F. Seward, P. Gorenstein, and W. Tucker.* **266**, 287, 30-A14 (1983)
- The Role of the Gas in Propagating Star Formation. *Philip E. Seiden.* **266**, 555, 34-C12 (1983)
- CCD Photometry of the Center of M31. *Stephen M. Kent.* **266**, 562, 34-D5 (1983)
- The Ionization Equilibrium inside the Rho Ophiuchi Cloud. *Theodore P. Snow, Jr.* **266**, 576, 34-E6 (1983)
- Peculiar Ultraviolet Interstellar Extinction. *Derck Massa, Blair D. Savage, and Edward L. Fitzpatrick.* **266**, 662, 35-D14 (1983)
- Observations of Diffuse Interstellar Lines toward Stars with Low Column Densities of  $H_2$ . *David M. Meyer.* **266**, L51, 32-D4 (1983)
- Interstellar Abundances of Oxygen and Nitrogen. *D. G. York, L. Spitzer, R. C. Bohlin, J. Hill, E. B. Jenkins, B. D. Savage, and T. P. Snow.* **266**, L55, 32-D8 (1983)
- NGC 315: High-Velocity  $H\,I$  in an Active Elliptical Galaxy? *L. L. Dressel, T. M. Bania, and M. M. Davis.* **266**, L97, 39-B12 (1983)
- CO Emission and the Optical Disk in the Giant Sc Galaxy M101. *P. M. Solomon, J. Barrett, D. B. Sanders, and R. de Zafra.* **266**, L103, 39-C3 (1983)
- Far-Ultraviolet Diffuse Emission Lines from the Interstellar Medium. *Francesco Paresce, Brunella C. Monsignor Fossi, and Massimo Landini.* **266**, L107, 39-C7 (1983)
- Effects of Environment on Neutral Hydrogen Distribution for Disk Galaxies in the Virgo Cluster Area. *C. Giovanardi, George Helou, E. E. Salpeter, and Nathan Krumm.* **267**, 35, 40-C13 (1983)
- Ultraviolet Interstellar Absorption toward HD 5980 in the Small Magellanic Cloud. *Edward L. Fitzpatrick and Blair D. Savage.* **267**, 93, 41-A6 (1983)
- The Polarization of Millimeter-Wave Emission Lines in Dense Interstellar Clouds. *P. G. Wannier, N. Z. Scoville, and R. Barvainis.* **267**, 126, 41-C11 (1983)
- The Dust around the Carbon Star IRC + 10216. *M. Jura.* **267**, 647, 47-G8 (1983)
- CO Emission in the Outer Galaxy between Longitudes  $50^\circ$  and  $72^\circ$ . *P. M. Solomon, A. A. Stark, and D. B. Sanders.* **267**, L29, 45-D6 (1983)
- Detection of Sulfur in the Galactic Center. *T. Herter, D. A. Briotta, Jr., G. E. Gull, M. A. Shure, and J. R. Houck.* **267**, L37, 45-D13 (1983)
- The Diffuse Interstellar Feature at  $4430\text{ \AA}$  and Interstellar Extinction in the Far-Ultraviolet. *Adolf N. Witt, Ralph C. Bohlin, and Theodore P. Stecher.* **267**, L47, 45-E8 (1983)
- An Attempt to Resolve Pulsar Magnetospheres Using Interstellar Scintillations. *J. M. Cordes, J. M. Weisberg, and V. Borjesson.* **268**, 370, 56-A1 (1983)
- The Distribution of Ionized Gas in the Nuclei of Spiral Galaxies. *William C. Keel.* **268**, 632, 60-A1 (1983)
- Interstellar  $H\alpha$  Emission along the Galactic Equator. *R. J. Reynolds.* **268**, 698, 60-G1 (1983)
- The Variation of Dust Temperatures in Maffei 2. *L. J. Rickard and P. M. Harvey.* **268**, L7, 57-A8 (1983)
- Observation of Ice Mantles toward HD 29647. *J. H. Goebel.* **268**, L41, 57-D4 (1983)
- The Galaxy's 157 Micron [C II] Emission: Observations by Means of a Spectroscopic Lunar Occultation Technique. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit.* **268**, L99, 63-G14 (1983)
- 21 Centimeter Observations of Supercluster Galaxies: The Bridge between Coma and A1367. *Guido L. Chincarini, Riccardo Giovanelli, and Martha P. Haynes.* **269**, 13, 65-B4 (1983)
- The Soft X-Ray Diffuse Background. *D. McCammon, D. N. Burrows, W. T. Sanders, and W. L. Kraushaar.* **269**, 107, 66-B4 (1983)
- CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. *Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville.* **269**, 136, 66-E5 (1983)
- Copernicus Observations of C I: Pressures and Carbon Abundances in Diffuse Interstellar Clouds. *Edward B. Jenkins, Michael Jura, and Michael Loewenstein.* **270**, 88, 78-A1 (1983)
- Interstellar Photoelectric Absorption Cross Sections, 0.03–10 keV. *Robert Morrison and Dan McCammon.* **270**, 119, 78-C4 (1983)
- Ultraviolet Flux Distributions of Stars in the Orion Nebula Cluster. *Robert J. Panek.* **270**, 169, 78-F14 (1983)
- Neutral Hydrogen Absorption in Early Spiral Galaxies. *I. F. Mirabel.* **270**, L35, 87-A7 (1983)
- Optical Polarimetry of Broad-Line Radio Galaxies. *Richard J. Rudy, G. D. Schmidt, H. S. Stockman, and Richard L. Moore.* **271**, 59, 88-E8 (1983)
- First Detection of the Ground-State  $J_K = 1_0-0$ , Submillimeter Transition of Interstellar Ammonia. *Jocelyn Keene, Geoffrey A. Blake, and T. G. Phillips.* **271**, L27, 93-B13 (1983)
- Synthesis Maps of Ultraviolet Observations of Neutral Interstellar Gas. *P. C. Frisch and D. G. York.* **271**, L59, 100-B3 (1983)
- Discovery of s-Process Nd in Allende Residue. *Donald D. Clayton.* **271**, L107, 100-E3 (1983)
- VLA Observations of Extragalactic  $NH_3$  in IC 342. *Paul T. P. Ho and Robert N. Martin.* **272**, 484, 107-B3 (1983)
- Neutral Interstellar Gas in the Lower Galactic Halo. *C. E. Albert.* **272**, 509, 107-C14 (1983)
- Interpretation of Neutral Hydrogen Spin Temperature Measurements. *H. E. Payne, E. E. Salpeter, and Yervant Terzian.* **272**, 540, 107-F9 (1983)
- Interstellar Polarization, Grain Growth, and Alignment. *Per A. Aarnestad and J. Mayo Greenberg.* **272**, 551, 107-G6 (1983)
- A Far-Ultraviolet Extinction Law: What Does It Mean? *J. Mayo Greenberg and Grzegorz Chliewicki.* **272**, 563, 108-A6 (1983)
- Polarization of Interstellar Molecular Radiofrequency Absorption Lines. *Nikolaos D. Kylafis and Paul R. Shapiro.* **272**, L35, 105-F12 (1983)
- A Note on Compressibility and Energy Cascade in Turbulent Molecular Clouds. *Robert C. Fleck, Jr.* **272**, L45, 111-A8 (1983)
- X-Ray Emission from Pre-Main-Sequence Stars, Molecular Clouds, and Star Formation. *Joseph Silk and Colin Norman.* **272**, L49, 111-A12 (1983)
- Some Current Trends in Milky Way Research. *Bart J. Bok.* **273**, 411, 118-A5 (1983)
- C IV Absorption in the High-Redshift BL Lac Object 0215+015. II. New Observations at  $20\text{ km s}^{-1}$  Resolution. *Max Pettini, Richard W. Hunstead, Hugh S. Murdoch, and J. Chris Blades.* **273**, 436, 118-C3 (1983)
- Submillimeter Observations of W3. *D. T. Jaffe, R. H. Hildebrand, Jocelyn Keene, and S. E. Whitcomb.* **273**, L89, 123-C11 (1983)
- Interstellar Absorption Lines in the Spectrum of 3C 273. *D. G. York, C. C. Wu, S. Ratcliff, J. C. Blades, L. L. Cowie, and D. C. Morton.* **274**, 136, 125-D2 (1983)
- Deceleration of Grand Unified Theory Monopoles in a Plasma. *Andrew J. S. Hamilton and Craig L. Sarazin.* **274**, 399, 128-B2 (1983)



- Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith.* **274**, 571, 131-E1 (1983)
- Stellar Evolution in *N*-Body Simulations of Disk Galaxies. I. *Neil F. Comins.* **274**, 595, 132-A1 (1983)
- Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. *Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic.* **274**, L43, 129-D3 (1983)
- Winds in Elliptical Galaxies. *Raymond E. White III and Roger A. Chevalier.* **275**, 69, 137-F11 (1983)
- H<sub>2</sub>O Heating in Molecular Clouds: Line Transfer and Thermal Balance in a Warm Dusty Medium. *Takamasa Takahashi, David J. Hollenbach, and Joseph Silk.* **275**, 145, 138-E14 (1983)
- H I Clouds, H I Spin Temperatures. *Harvey S. Liszt.* **275**, 163, 138-G6 (1983)
- Thermochemical Instabilities in Reacting Gases. I. Plasma of Hydrogen. *Miguel H. Ibañez and Antonio Parravano.* **275**, 181, 139-A11 (1983)
- The Spherical Harmonics Solution for the Radiation Field in Plane-parallel Clouds with Embedded Sources. *W. G. Roberge.* **275**, 292, 140-B14 (1983)
- VLA Observations of the Neutral Hydrogen Content of NGC 185 and NGC 205. *Douglas W. Johnson and S. T. Gottesman.* **275**, 549, 143-D14 (1983)
- IUE Observations of the Exciting Stars of Giant H II Regions in M33: Supermassive Stars? *Philip Massey and J. B. Hutchings.* **275**, 578, 143-G9 (1983)
- The Ambipolar Diffusion Time Scale and the Location of Star Formation in Magnetic Interstellar Gas Clouds. *Eugene Howard Scott.* **275**, 836, 146-F3 (1983)
- The Magnetic Flux Problem and Ambipolar Diffusion during Star Formation: One-dimensional Collapse. I. Formulation of the Problem and Method of Solution. *Efsthimios V. Paleologou and Telemachos Ch. Mouschovias.* **275**, 838, 146-F5 (1983)
- White Dwarfs and the Interstellar Medium. *A. K. Dupree and J. C. Raymond.* **275**, L71, 148-D10 (1983)
- A Survey of Ultraviolet Interstellar Absorption Lines. *Ralph C. Bohlin, Jesse K. Hill, Edward B. Jenkins, Blair D. Savage, Theodore P. Snow, Jr., Lyman Spitzer, Jr., and Donald G. York.* **51**, 277, 6-B1 (1983) (Abstr. in **265**, 1135, 25-B11)
- Regions of Low Molecular Column Density Near the Galactic Plane. *F. Verter, G. R. Knapp, A. A. Stark, and R. W. Wilson.* **52**, 289, 13-D8 (1983) (Abstr. in **269**, 809, 75-C8)
- AB Stars in the Southern Galactic Halo. II. Spectroscopy and Radial Velocities. *Jeffrey R. Pier.* **53**, 791, 27-E2 (1983) (Abstr. in **274**, 922, 135-E3)
- Interstellar: Molecules**
- Do the W44 and W28 Molecular Clouds Show Evidence of a Shock? *L. K. DeNoyer.* **264**, 141, 2-D9 (1983)
- Observations of the Extinction and Excitation of the Molecular Hydrogen Emission in Orion. *S. Beckwith, Neal J. Evans II, I. Gatley, G. Gull, and R. W. Russell.* **264**, 152, 2-E6 (1983)
- Observations of Sulfur Dioxide in the Kleinmann-Low Nebula. *F. Peter Schloerb, Per Friberg, Åke Hjalmarson, Bertil Höglund, and William M. Irvine.* **264**, 161, 2-F1 (1983)
- Magnetohydrodynamic Shock Waves in Molecular Clouds. *B. T. Draine, W. G. Roberge, and A. Dalgarno.* **264**, 485, 7-E11 (1983)
- Protostellar Rotation: Turbulence and Heating of Molecular Clouds. *José Franco.* **264**, 508, 7-G6 (1983)
- Dense Cores in Dark Clouds. I. CO Observations and Column Densities of High-Extinction Regions. *P. C. Myers, Richard A. Linke, and P. J. Benson.* **264**, 517, 8-A1 (1983)
- Methanol in Orion A: Simultaneous Observations of Corresponding Rotational Transitions in the Ground and Torsionally Excited States. *J. M. Hollis, F. J. Lovas, R. D. Suenram, P. R. Jewell, and L. E. Snyder.* **264**, 543, 8-C2 (1983)
- High-Resolution Near-Infrared and Millimeter-Wave Spectroscopy of NGC 7027. *Harley A. Thronson, Jr.* **264**, 599, 8-G5 (1983)
- Laboratory and Astronomical Measurement of the Millimeter Wave Spectrum of the Ethynyl Radical CCH. *C. A. Gottlieb, E. W. Gottlieb, and P. Thaddeus.* **264**, 740, 10-D4 (1983)
- Laboratory Millimeter and Submillimeter Spectrum of HOC<sup>+</sup>. *Geoffrey A. Blake, Paul Helminger, Eric Herbst, and Frank C. De Lucia.* **264**, L69, 11-C12 (1983)
- The Molecular Gas Distribution in M51. *Nick Scoville and Judith S. Young.* **265**, 148, 13-F5 (1983)
- CN in Dark Clouds. *Ed Churchwell and John H. Bieging.* **265**, 216, 14-D14 (1983)
- Water-Vapor Masers Located near Herbig-Haro Objects. *A. D. Haschick, J. M. Moran, L. F. Rodriguez, and P. T. P. Ho.* **265**, 281, 15-B13 (1983)
- Identification of the Emission Features near 3.5 Microns in the Pre-Main-Sequence Star HD 97048. *F. Baas, L. J. Allamandola, T. R. Geballe, S. E. Persson, and J. H. Lacy.* **265**, 290, 15-C8 (1983)
- Formation of OB Clusters: OH Maser Observations. *Paul T. P. Ho, Aubrey D. Haschick, Stuart N. Vogel, and Melvyn C. H. Wright.* **265**, 295, 15-C14 (1983)
- CO Emission in Directions of Some Millimeter Wavelength Continuum Sources. *A. G. Kislyakov and M. A. Gordon.* **265**, 766, 21-B5 (1983)
- Ionized Gas in Active Molecular Cloud Cores. *John Bally and Read Predmore.* **265**, 778, 21-C3 (1983)
- Molecular Gas in the W33 Region. *Paul F. Goldsmith and Xin-Jie Mao.* **265**, 791, 21-D2 (1983)
- An Optical Study of IC 1470. *Beverly T. Lynds and Earl J. O'Neil, Jr.* **265**, 803, 21-E1 (1983)
- Ab Initio Spin-Orbit Coupling Constants for Potential Exotic Interstellar Molecules. *David L. Cooper.* **265**, 808, 21-E8 (1983)
- The High-Velocity Molecular Flows near Young Stellar Objects. *John Bally and Charles J. Lada.* **265**, 824, 21-F10 (1983)
- Molecular Emission Bands in the Ultraviolet Spectrum of the Red Rectangle Star HD 44179. *Michael L. Siiko.* **265**, 848, 22-A10 (1983)
- Interactions between Pre-Main-Sequence Objects and Molecular Clouds. I. Elias 1-12. *Russell M. Levreault.* **265**, 855, 22-B4 (1983)
- Observations of H<sub>2</sub> Emission from Molecular Clouds and Herbig-Haro Objects. *Theodore Simon and R. R. Joyce.* **265**, 864, 22-B14 (1983)
- Small Rotating Clouds of Stellar Mass in Orion Molecular Cloud 1. *Andrew Harris, C. H. Townes, D. N. Matsakis, and Patrick Palmer.* **265**, L63, 26-C6 (1983)
- Dense Cores in Dark Clouds. II. NH<sub>3</sub> Observations and Star Formation. *P. C. Myers and P. J. Benson.* **266**, 309, 30-C10 (1983)
- J* = 2-1 CO Observations of Molecular Clouds with High-Velocity Gas: Evidence for Clumpy Outflows. *Richard L. Plambeck, Ronald L. Snell, and Robert B. Loren.* **266**, 321, 30-D8 (1983)
- The Kinetic Temperature and Density of the Sagittarius Molecular B2 Cloud from Observations of Methyl Cyanide. *Sally E. Cummins, Sheldon Green, P. Thaddeus, and R. A. Linke.* **266**, 331, 30-E4 (1983)
- The Role of the Gas in Propagating Star Formation. *Philip E. Seiden.* **266**, 555, 34-C12 (1983)
- The Ionization Equilibrium inside the Rho Ophiuchi Cloud. *Theodore P. Snow, Jr.* **266**, 576, 34-E6 (1983)
- The Molecular Cloud Complex Associated with ON 1. *F. P.*

## Interstellar: Molecules—Continued

- Israel and H. A. Wootten. **266**, 580, 34-E10 (1983)
- VLA Observations of Warm  $\text{NH}_3$  Associated with Mass Outflows in W51. Paul T. P. Ho, Reinhard Genzel, and Anirudha Das. **266**, 596, 34-F14 (1983)
- The Acceleration of Molecular Hydrogen Clouds through Radiative Dissociation. Martin Harwit and Johannes Schmid-Burgk. **266**, 602, 34-G6 (1983)
- On Vibrational Excitations of Interstellar Molecules. Moshe Elitzur. **266**, 609, 35-A1 (1983)
- Infrared Spectroscopy of the Sources in S235 and Its Implication for the Line Excess Problem. Rodger I. Thompson, Harley A. Thronson, Jr., and Bel Campbell. **266**, 614, 35-A6 (1983)
- Effects of a Shock on the Molecular Composition of a Diffuse Interstellar Cloud. George F. Mitchell and Terry J. Deveau. **266**, 646, 35-C12 (1983)
- CO Emission and the Optical Disk in the Giant Sc Galaxy M101. P. M. Solomon, J. Barrett, D. B. Sanders, and R. de Zafra. **266**, L103, 39-C3 (1983)
- The Polarization of Millimeter-Wave Emission Lines in Dense Interstellar Clouds. P. G. Wannier, N. Z. Scoville, and R. Barvainis. **267**, 126, 41-C11 (1983)
- Polarization of Interstellar Radio-Frequency Lines and Magnetic Field Direction. Nikolaos D. Kylafis. **267**, 137, 41-D8 (1983)
- Further Analysis of the Possible Effects of Isotope-selective Photodissociation on Interstellar Carbon Monoxide. Y.-H. Chu and W. D. Watson. **267**, 151, 41-E8 (1983)
- Structure of Dense Molecular Gas in TMC 1 from Observations of Three Transitions of  $\text{HC}_3\text{N}$ . F. Peter Schloerb, Ronald L. Snell, and Judith S. Young. **267**, 163, 41-F7 (1983)
- Shock Formation of  $\text{HCO}^+$ . Moshe Elitzur. **267**, 174, 41-G4 (1983)
- High-Velocity Outflow Sources in Molecular Clouds: The Case for Low-Mass Stars. S. Beckwith, A. Natta, and E. E. Salpeter. **267**, 596, 47-C12 (1983)
- X-Ray Ionization and the Orion Molecular Cloud. Julian H. Krolik and Timothy R. Kallman. **267**, 610, 47-D12 (1983)
- UV Radiation Field inside Dense Clouds: Its Possible Existence and Chemical Implications. Sheo S. Prasad and Shankar P. Tarafdar. **267**, 603, 47-D5 (1983)
- VLA Observations of the  $^2\pi_{3/2} = 3/2$  Masers Associated with Orion A. S. S. Hansen and K. J. Johnston. **267**, 625, 47-E13 (1983)
- Formation of OB Clusters: W33 Complex. Aubrey D. Haschick and Paul T. P. Ho. **267**, 638, 47-F13 (1983)
- CO Emission in the Outer Galaxy between Longitudes  $50^\circ$  and  $72^\circ$ . P. M. Solomon, A. A. Stark, and D. B. Sanders. **267**, L29, 45-D6 (1983)
- Source of the High-Velocity Molecular Flow in Orion. M. C. H. Wright, R. L. Plambeck, S. N. Vogel, P. T. P. Ho, and W. J. Welch. **267**, L41, 45-E3 (1983)
- Detection of the  $J = 1 \rightarrow 0$  Transition of  $\text{CH}_3\text{CN}$ . Henry E. Matthews and Trevor J. Sears. **267**, L53, 45-E13 (1983)
- High-Density Gas Associated with "Molecular Jets": NGC 1333 and NGC 2071. P. R. Schwartz, John A. Waak, and Howard A. Smith. **267**, L109, 51-C12 (1983)
- Radiative Association and the Synthesis of Long Carbon Chain Molecules in Interstellar Clouds. D. R. Bates. **267**, L121, 51-D10 (1983)
- An Extensive Galactic Search for Conformer II Glycine. L. E. Snyder, J. M. Hollis, R. D. Suenram, F. J. Lovas, L. W. Brown, and D. Buhl. **268**, 123, 53-C3 (1983)
- Warm H I Halos around Molecular Clouds. Peter G. Wannier, Stephen M. Lichten, and Mark Morris. **268**, 727, 61-B5 (1983)
- Stellar Winds and Molecular Clouds: T Tauri Stars. Nuria Calvet, Jorge Cantó, and L. F. Rodríguez. **268**, 739, 61-C3 (1983)
- The Variation of Dust Temperatures in Maffei 2. L. J. Rickard and P. M. Harvey. **268**, L7, 57-A8 (1983)
- The Microwave and Far-Infrared Spectra of the CH Radical. J. M. Brown and K. M. Evenson. **268**, L51, 57-D13 (1983)
- CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville. **269**, 136, 66-E5 (1983)
- The Structure of Bright-rimmed Molecular Clouds. Alwyn Wootten, Anneela Sargent, Gillian Knapp, and P. J. Huguenin. **269**, 147, 66-F4 (1983)
- The M17 SW Molecular Cloud. Harley A. Thronson, Jr. and Charles J. Lada. **269**, 175, 67-A4 (1983)
- Laboratory Measurements of Ion-Molecule Reactions Pertaining to Interstellar Hydrocarbon Synthesis. Eric Herbst, Nigel G. Adams, and David Smith. **269**, 329, 68-F12 (1983)
- X-Ray Sources in Molecular Clouds. Stephen Lepp and Richard McCray. **269**, 560, 72-E7 (1983)
- A Rotating Protocluster in W58:  $\text{HCO}^+$  Aperture Synthesis Maps. S. N. Vogel and W. J. Welch. **269**, 568, 72-F1 (1983)
- Infrared Observations of OB Star Formation in NGC 6334. Paul M. Harvey and Ian Gatley. **269**, 613, 73-B5 (1983)
- Detection of Interstellar  $\text{NH}_3$  in the Far-Infrared: Warm and Dense Gas in Orion-KL. C. H. Townes, R. Genzel, Dan M. Watson, and J. W. V. Storey. **269**, L11, 69-A12 (1983)
- On the Possibly Low  $\text{H}_2$  Formation Rate in Dense Clouds. Theodore P. Snow. **269**, L57, 76-C2 (1983)
- Copernicus Observations of C I: Pressures and Carbon Abundances in Diffuse Interstellar Clouds. Edward B. Jenkins, Michael Jura, and Michael Loewenstein. **270**, 88, 78-A1 (1983)
- Dense Cores in Dark Clouds. III. Subsonic Turbulence. P. C. Myers. **270**, 105, 78-B4 (1983)
- The Distribution of Molecular Clouds in the Nuclear Region of NGC 1068. N. Z. Scoville, Judith S. Young, and L. B. Lucy. **270**, 443, 83-A10 (1983)
- Hydromagnetic Wave Dissipation in Molecular Clouds. Ellen G. Zweibel and Karl Josaftsson. **270**, 511, 83-F12 (1983)
- Theory of Molecular Formation by Radiative Association in Interstellar Clouds. D. R. Bates. **270**, 564, 84-C9 (1983)
- The Kinetic Theory of  $\text{H}_2$  Dissociation. Stephen Lepp and J. Michael Shull. **270**, 578, 84-D9 (1983)
- The  $[\text{HCO}^+]/[\text{HOC}^+]$  Abundance Ratio in Molecular Clouds. R. C. Woods, C. S. Gudeman, R. L. Dickman, P. F. Goldsmith, G. R. Huguenin, W. M. Irvine, Å. Hjalmarson, L.-Å. Nyman, and H. Olofsson. **270**, 583, 84-D14 (1983)
- Dense Cores in Dark Clouds. IV.  $\text{HC}_3\text{N}$  Observations. P. J. Benson and P. C. Myers. **270**, 589, 84-E6 (1983)
- A Survey of High-Velocity Molecular Gas in the Vicinity of Herbig-Haro Objects. I. Suzan Edwards and Ronald L. Snell. **270**, 605, 84-F8 (1983)
- Molecular Clouds on the Threshold of Star Formation: The Radial Density Profile of the Cores of the Rho Ophiuchi and R Coronae Australis Clouds. Robert B. Loren, Aa. Sandkvist, and A. Wootten. **270**, 620, 84-G9 (1983)
- A Gravitationally Stable Bok Globule. R. L. Dickman and Dan P. Clemens. **271**, 143, 89-E1 (1983)
- Cyanoacetylene as a Density Probe of Molecular Clouds. Paul A. Vanden Bout, Robert B. Loren, Ronald L. Snell, and Alwyn Wootten. **271**, 161, 89-F7 (1983)
- Comparisons of  $\text{C}^+$  Distributions with New Interstellar Sources of HCO Emission. J. M. Hollis and E. Churchwell. **271**, 170, 89-G4 (1983)
- The Spatial Distribution of Shocked Gas in the Orion Nebula. S. C. Beck and S. Beckwith. **271**, 175, 89-G9 (1983)
- Detection of  $\text{CH}_3\text{OH } J = 5 \rightarrow 4$  Lines around 242 GHz from OMC-1. W. Boland, Th. de Graauw, S. Lindholm, and T. J. Lee. **271**, 183, 90-A4 (1983)
- Spiral Gravitational Potentials and the Mass Growth of Molecular Clouds. John Kwan and Francisco Valdes. **271**, 604, 96-B5 (1983)

- Carbon Monoxide Emission from Planetary Nebulae and Their Possible Precursors. *Harley A. Thronson, Jr. and David Morzkewich.* **271**, 611, 96-B12 (1983)
- Primordial Star Formation: The Role of Molecular Hydrogen. *Francesco Palla, E. E. Salpeter, and Steven W. Stahler.* **271**, 632, 96-D6 (1983)
- First Detection of the Ground-State  $J_K = 1_0 \rightarrow 0_0$  Submillimeter Transition of Interstellar Ammonia. *Jocelyn Keene, Geoffrey A. Blake, and T. G. Phillips.* **271**, L27, 93-B13 (1983)
- Detection of  $\text{H}^{13}\text{NN}^+$  and  $\text{HN}^{13}\text{N}^+$  in Interstellar Clouds. *Richard A. Linke, Michel Guélin, and William D. Langer.* **271**, L85, 100-C12 (1983)
- The Distribution of 6 Centimeter  $\text{H}_2\text{CO}$  in Orion Molecular Cloud 1. *K. J. Johnston, Patrick Palmer, T. L. Wilson, and J. H. Bieging.* **271**, L89, 100-D2 (1983)
- Interstellar  $\text{C}_2$  Molecules in a Taurus Dark Cloud. *L. M. Hobbs, John H. Black, and Ewine F. van Dishoeck.* **271**, L95, 100-D7 (1983)
- Observations of Interstellar  $\text{C}_2$  toward Three Heavily Reddened Stars. *Barry L. Lutz and Richard M. Crutcher.* **271**, L101, 100-D12 (1983)
- The Detection of Vinyl Cyanide in TMC-1. *Henry E. Matthews and Trevor J. Sears.* **272**, 149, 102-F2 (1983)
- Association Reactions of  $\text{Na}^+$  and Some Implications for Interstellar Chemistry. *David Smith, Nigel G. Adams, Erich Alge, and Eric Herbst.* **272**, 365, 105-A6 (1983)
- VLA Observations of Extragalactic  $\text{NH}_3$  in IC 342. *Paul T. P. Ho and Robert N. Martin.* **272**, 484, 107-B3 (1983)
- Synthesis of Chain Molecules in Regions with Partially Ionized Carbon. *Hiroko Suzuki.* **272**, 579, 108-B8 (1983)
- The Kinetic Temperature and  $\text{CH}_3\text{CCH}$  Column Density Profiles in Sgr B2, Orion, and DR 21. *E. Churchwell and J. M. Hollis.* **272**, 591, 108-C6 (1983)
- A Large Molecular Cloud toward the SNR W50 and SS 433. *Y.-L. Huang, T. M. Dame, and P. Thaddeus.* **272**, 609, 108-D10 (1983)
- Polarization of Interstellar Molecular Radiofrequency Absorption Lines. *Nikolaos D. Kylafis and Paul R. Shapiro.* **272**, L35, 105-F12 (1983)
- Isotopic Fractionation and Mass Motion in Giant Molecular Clouds. *A. A. Penzias.* **273**, 195, 114-C14 (1983)
- Some Current Trends in Milky Way Research. *Bart J. Bok.* **273**, 411, 118-A5 (1983)
- The Unique Cometary Nebula Parsamian 13. *Martin Cohen, D. K. Aitkin, P. F. Roche, and P. M. Williams.* **273**, 624, 120-D2 (1983)
- Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wooten, C. Masson, and M. A. Frerking.* **273**, 633, 120-D13 (1983)
- The Detection of Butadiynyl ( $\text{C}_4\text{H}$ ) in Absorption against Cassiopeia A. *M. B. Bell, P. A. Feldman, and H. E. Matthews.* **273**, L35, 117-D7 (1983)
- Vibrationally Excited  $\text{CH}_3\text{CN}$  and  $\text{HC}_3\text{N}$  in Orion. *Paul F. Goldsmith, Robert Krotkov, Ronald L. Snell, R. D. Brown, and Peter Godfrey.* **274**, 184, 125-G8 (1983)
- Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? *José M. Torrelles, Luis F. Rodríguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho.* **274**, 214, 126-B10 (1983)
- Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Bucccheri, P. A. Caraveo, M. Gotwald, W. Hermesen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills.* **274**, 231, 126-C13 (1983)
- VLA Continuum and OH Line Emission Observations of the Compact Nebula VY2-2. *E. R. Seaquist and L. E. Davis.* **274**, 659, 132-E14 (1983)
- Centrifugally Driven Winds from Contracting Molecular Disks. *R. E. Pudritz and C. A. Norman.* **274**, 677, 132-G4 (1983)
- The Brighter 94 Micron Sources Observed by the Far-Infrared Sky Survey Experiment. *Stephan D. Price, K. Shivanandan, Thomas L. Murdock, and Phillip F. Bowers.* **275**, 125, 138-D8 (1983)
- $\text{H}_2\text{O}$  Heating in Molecular Clouds: Line Transfer and Thermal Balance in a Warm Dusty Medium. *Takamasa Takahashi, David J. Hollenbach, and Joseph Silk.* **275**, 145, 138-E14 (1983)
- A Search for  $^2\text{H}$ ,  $N=1$ ,  $J=3/2$  Lambda-Doubling Transitions of  $\text{CH}$ . *L. M. Ziurys, C. Henkel, and R. J. Saykally.* **275**, 175, 139-A4 (1983)
- Laboratory Detection of the  $\text{C}_3\text{N}$  and  $\text{C}_4\text{H}$  Free Radicals. *C. A. Gottlieb, E. W. Gottlieb, P. Thaddeus, and H. Kawamura.* **275**, 916, 147-E3 (1983)
- The Distribution of the  $\text{CO } J = 2-1$  Emission from M82. *E. C. Sutton, C. R. Masson, and T. G. Phillips.* **275**, L49, 148-C2 (1983)
- Molecular Emission Which Is Probably Localized within the Central 10 Parsecs of the Galaxy. *Y. Fukui, H. Ogawa, and S. Deguchi.* **275**, L55, 148-C9 (1983)
- Curves for Analysis of the Two Lowest Rotational Transitions of Carbon Monoxide Using the Large Velocity Gradient Radiative Transfer Model. *Paul F. Goldsmith, Judith S. Young, and William D. Langer.* **51**, 203, 4-C1 (1983) (Abstr. in **264**, 748, 10-D12)
- Regions of Low Molecular Column Density Near the Galactic Plane. *F. Verter, G. R. Knapp, A. A. Stark, and R. W. Wilson.* **52**, 289, 13-D8 (1983) (Abstr. in **269**, 809, 75-C8)
- Ion-Molecule Syntheses of Interstellar Molecular Hydrocarbons through  $\text{C}_4\text{H}$ : Toward Molecular Complexity. *Eric Herbst.* **53**, 41, 17-D3 (1983) (Abstr. in **271**, 890, 99-B12)
- Abundances of Carbon-bearing Diatomic Molecules in Diffuse Interstellar Clouds. *R. L. Dickman, W. B. Somerville, D. C. B. Whittet, D. McNally, and J. C. Blades.* **53**, 55, 17-E2 (1983) (Abstr. in **271**, 891, 99-B13)
- Ionization: see Atomic Processes**
- Laboratory Spectra**
- Laboratory and Astronomical Measurement of the Millimeter Wave Spectrum of the Ethynyl Radical  $\text{CCH}$ . *C. A. Gottlieb, E. W. Gottlieb, and P. Thaddeus.* **264**, 740, 10-D4 (1983)
- Laboratory Millimeter and Submillimeter Spectrum of  $\text{HOC}^+$ . *Geoffrey A. Blake, Paul Helminger, Eric Herbst, and Frank C. De Lucia.* **264**, L69, 11-C12 (1983)
- Inner-Shell Transitions in Fe XIX-XXII in the X-Ray Spectra of Solar Flares and Tokamaks. *K. J. H. Phillips, J. R. Lemen, R. D. Cowan, G. A. Doschek, and J. W. Leibacher.* **265**, 1120, 25-A10 (1983)
- Laboratory Measurement of the  $4_{04}-3_{13}$  70 GHz Transition of Ground-State Methylene ( $\text{CH}_2$ ). *F. J. Lovas, R. D. Suenram, and K. M. Evenson.* **267**, L131, 51-E5 (1983)
- The Microwave and Far-Infrared Spectra of the  $\text{CH}$  Radical. *J. M. Brown and K. M. Evenson.* **268**, L51, 57-D13 (1983)
- Laboratory Measurements of Ion-Molecule Reactions Pertaining to Interstellar Hydrocarbon Synthesis. *Eric Herbst, Nigel G. Adams, and David Smith.* **269**, 329, 68-F12 (1983)
- Laboratory Measurement of the  $J = 2 \rightarrow 3$  Rotational Transition Frequency of  $\text{HC}^{18}\text{O}^+$ . *Grant M. Plummer, Eric Herbst, and Frank C. De Lucia.* **270**, L99, 87-F7 (1983)
- Monodeuterated Methane in the Outer Solar System. I. Spectroscopic Analysis of the Bands at 1.55 and 1.95 Microns. *Barry L. Lutz, C. de Bergh, and J. P. Maillard.* **273**, 397, 116-E7 (1983)
- Laboratory Detection of the  $\text{C}_3\text{N}$  and  $\text{C}_4\text{H}$  Free Radicals. *C. A. Gottlieb, E. W. Gottlieb, P. Thaddeus, and H. Kawamura.* **275**, 916, 147-E3 (1983)
- Fourier Spectroscopy of the  $^{12}\text{C}_2$ ,  $^{13}\text{C}_2$ , and  $^{12}\text{C}^{13}\text{C}(0-0)$  Swan

**Laboratory Spectra—Continued**

Bands. *C. Amiot*. **52**, 329, 14-A2 (1983) (Abstr. in **269**, 808, 75-C7)

The Emission Spectrum of Yttrium Monoxide: New Rotational and Vibrational Results on the  $A^2\Pi-X^2\Sigma^+$  System. *A. Bernard and R. Gravina*. **52**, 443, 16-D1 (1983) (Abstr. in **270**, 780, 86-E7)

**Line Formation**

Theoretical Quasar Emission-Line Profiles. I. Curve-of-Growth Effects on Observed Profiles. *E. N. Hubbard and R. C. Puetter*. **265**, 35, 12-D10 (1983)

A Non-Spherically Symmetric Model for Absorption Regions near Quasars. *Vesa T. Junkkarinen*. **265**, 73, 12-G7 (1983)

Fluid Motions in the Solar Chromosphere-Corona Transition Region. I. Line Widths and Doppler Shifts for C iv. *R. G. Athay, J. B. Gurman, W. Henze, and R. A. Shine*. **265**, 519, 17-F3 (1983)

Formation of the Cl I Lines at 1351 Å in the Solar Chromosphere. *R. A. Shine*. **266**, 882, 38-A5 (1983)

Structure and Spectrum of Quiescent Prominences. IV. The Ultraviolet Ionization Continua of Hydrogen and Helium. *J. N. Heasley and R. W. Milkey*. **268**, 398, 56-C1 (1983)

Diode Laser Heterodyne Observations of Silicon Monoxide in Sunspots: A Test of Three Sunspot Models. *D. A. Glenar, D. Deming, D. E. Jennings, T. Kostjuk, and M. J. Mumma*. **269**, 309, 68-E4 (1983)

Time-Dependent Scattering in Resonance Lines. *Paul B. Kunasz*. **271**, 321, 91-D12 (1983)

Desaturation of H<sub>2</sub> Quadrupole Lines in the Atmospheres of the Outer Planets. *William D. Cochran and Wm. Hayden Smith*. **271**, 859, 98-G6 (1983)

Second-Order Escape Probability Approximations in Radiative Transfer: Erratum. *D. G. Hummer and George B. Rybicki*. **271**, 888, 99-B10 (1983) (Orig. paper in **263**, 925, 141-G7)

Theoretical Quasar Emission-Line Profiles. II. Effects of Source Function Variation and Total Thickness. *R. C. Puetter and E. N. Hubbard*. **273**, 36, 112-E2 (1983)

The Narrow-Line Region of Intermediate Seyfert Galaxies. *Ross D. Cohen*. **273**, 489, 119-A1 (1983)

The Formation of Resonance Lines in Locally Nonmonotonic Winds. II. An Amplitude Diagnostic. *L. B. Lucy*. **274**, 372, 127-G3 (1983)

Broad Emission Features in QSOs and Active Galactic Nuclei. I. New Calculations of Fe II Line Strengths. *Hagai Netzer and Beverley J. Wills*. **275**, 445, 142-D4 (1983)

SkyLab Observations of the Solar C I Multiplets at  $\lambda 1560$  and  $\lambda 1657$ . *D. Roussel-Dupré*. **275**, 892, 147-C7 (1983)

**Line Identifications**

CN in Dark Clouds. *Ed Churchwell and John H. Bieging*. **265**, 216, 14-D14 (1983)

Molecular Emission Bands in the Ultraviolet Spectrum of the Red Rectangle Star HD 44179. *Michael L. Sitko*. **265**, 848, 22-A10 (1983)

Inner-Shell Transitions in Fe XIX–XXII in the X-Ray Spectra of Solar Flares and Tokamaks. *K. J. H. Phillips, J. R. Lemen, R. D. Cowan, G. A. Doschek, and J. W. Leibacher*. **265**, 1120, 25-A10 (1983)

PKS 0119–046 and the Origin of Infalling Absorption-Line Systems in Quasars. *C. Martin Gaskell*. **267**, L1, 45-B2 (1983)

An Extensive Galactic Search for Conformer II Glycine. *L. E. Snyder, J. M. Hollis, R. D. Suenram, F. J. Lovas, L. W. Brown, and D. Buhl*. **268**, 123, 53-C3 (1983)

The Microwave and Far-Infrared Spectra of the CH Radical. *J. M. Brown and K. M. Evenson*. **268**, L51, 57-D13 (1983)

The Type I Supernova 1981b in NGC 4536: The First 100 Days. *David Branch, C. H. Lacy, Marshall L. McCall, P. G. Sutherland, A. Uomoto, J. C. Wheeler, and B. J. Wills*. **270**, 123, 78-C9 (1983)

The C<sub>2</sub>H, C<sub>2</sub>, and CN Electronic Absorption Bands in the Carbon Star HD 19557. *J. H. Goebel, J. D. Bregman, D. M. Cooper, D. Goorvitch, S. R. Langhoff, and F. C. Witteborn*. **270**, 190, 79-A7 (1983)

Dense Cores in Dark Clouds. IV. HC<sub>3</sub>N Observations. *P. J. Benson and P. C. Myers*. **270**, 589, 84-E6 (1983)

The 0.9–2.5 Micron Spectrum of Comet West 1976 VI. *James R. Johnson, Uwe Fink, and Harold P. Larson*. **270**, 769, 86-D10 (1983)

Infrared Spectra of WN Stars. I. HD 50896. *D. J. Hillier, T. J. Jones, and A. R. Hyland*. **271**, 221, 90-D9 (1983)

Element Identifications in the Ultraviolet Spectrum of HD 101065. *G. Wegner, D. J. Cummins, P. B. Byrne, and D. J. Stickland*. **272**, 646, 108-G5 (1983)

Monodeuterated Methane in the Outer Solar System. I. Spectroscopic Analysis of the Bands at 1.55 and 1.95 Microns. *Barry L. Lutz, C. de Bergh, and J. P. Maillard*. **273**, 397, 116-E7 (1983)

Vibrationally Excited CH<sub>3</sub>CN and HC<sub>3</sub>N in Orion. *Paul F. Goldsmith, Robert Krotkov, Ronald L. Snell, R. D. Brown, and Peter Godfrey*. **274**, 184, 125-G8 (1983)

Observations of NGC 7027 from 5.2 to 7.5 Microns: The Detection of Ni II and Additional Dust Features. *J. D. Bregman, H. L. Dinerstein, J. H. Goebel, D. F. Lester, F. C. Witteborn, and D. M. Rank*. **274**, 666, 132-F7 (1983)

Laboratory Detection of the C<sub>3</sub>N and C<sub>4</sub>H Free Radicals. *C. A. Gottlieb, E. W. Gottlieb, P. Thaddeus, and H. Kawamura*. **275**, 916, 147-E3 (1983)

New Identifications of Allowed  $2p^33l-2p^33l'$  Transitions and Forbidden  $2p^23s(^3P_0-^3P_1)$  Coronal Lines in the Ne I Sequence. *Sidney O. Kastner*. **275**, 922, 147-E9 (1983)

Identification of the Solar Emission Lines near 12 Microns. *E. S. Chang and R. W. Noyes*. **275**, L11, 141-F11 (1983)

IUE Spectrum of the Io Torus: Identification of the  $^3S_2 \rightarrow ^3P_{2,1}$  Transitions of S III. *H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou*. **275**, L19, 141-G4 (1983)

The Emission Spectrum of Yttrium Monoxide: New Rotational and Vibrational Results on the  $A^2\Pi-X^2\Sigma^+$  System. *A. Bernard and R. Gravina*. **52**, 443, 16-D1 (1983) (Abstr. in **270**, 780, 86-E7)

The Solar O III Spectrum. II. Longer Wavelengths, Line Widths, and the He II Lyman  $\alpha$  Radiation Field. *S. O. Kastner, W. E. Behring, and A. K. Bhatia*. **53**, 129, 18-C6 (1983) (Abstr. in **271**, 892, 99-B14)

**Line Profiles**

Theoretical Quasar Emission-Line Profiles. I. Curve-of-Growth Effects on Observed Profiles. *E. N. Hubbard and R. C. Puetter*. **265**, 35, 12-D10 (1983)

Spectrophotometry of the Broad Absorption-Line QSO PHL 5200. *Vesa T. Junkkarinen, E. Margaret Burbidge, and Harding E. Smith*. **265**, 51, 12-E13 (1983)

Pulsational Mode-Typing in Line Profile Variables. V. Multimodes and "Moving Shells" in  $\nu$  Eridani and Other  $\beta$  Cephei Stars. *Myron A. Smith*. **265**, 338, 15-G2 (1983)

Why Are Broad Emission Lines Seen in Seyfert Galaxies and Not in BL Lacertae Objects? *P. W. Guilbert, A. C. Fabian, and Richard McCray*. **266**, 466, 33-D6 (1983)

The Dependence of H $\alpha$  on Chromospheric Activity in G and K Main-Sequence Stars. *D. M. Zarro*. **267**, L61, 45-F6 (1983)

Stellar Winds and Molecular Clouds: T Tauri Stars. *Nuria Calvet, Jorge Cantó, and L. F. Rodríguez*. **268**, 739, 61-C3 (1983)

H $\alpha$  Line Profiles in B Stars: Comparison of Theory and Observations. *J. N. Heasley and Sidney C. Wolff*. **269**, 634, 73-C14 (1983)

High-Velocity Iron Absorption Lines in Supernova Remnant 1006. *Chi-Chao Wu, Marvin Leventhal, Craig L. Sarazin, and Theodore R. Gull*. **269**, L5, 69-A7 (1983)



- Solar Emission Lines near 12 Microns. *J. Brault and R. Noyes*. **269**, L61, 76-C5 (1983)
- Stellar Images Derived from Rotation Broadening: AW Ursae Majoris. *Lawrence Anderson, Darryl Stanford, and Douglas Leininger*. **270**, 200, 79-B3 (1983)
- High Spatial and Temporal Resolution Observations of the Solar Ca II H Line. *L. E. Cram and Luc Damé*. **272**, 355, 104-G7 (1983)
- H I Lyman-Alpha in the Sun: The Effects of Partial Redistribution in the Line Wings. *D. Roussel-Dupré*. **272**, 723, 109-F3 (1983)
- Theoretical Quasar Emission-Line Profiles. II. Effects of Source Function Variation and Total Thickness. *R. C. Puetter and E. N. Hubbard*. **273**, 36, 112-E2 (1983)
- The Formation of Emission Lines in the Expanding Chromospheres of Luminous Cool Stars. I. The Importance of Atmospheric Extension and Partial Redistribution Effects. *S. A. Drake and J. L. Linsky*. **273**, 299, 115-E1 (1983)
- C IV Absorption in the High-Redshift BL Lac Object 0215+015. II. New Observations at 20 km s<sup>-1</sup> Resolution. *Max Pettini, Richard W. Hunstead, Hugh S. Murdoch, and J. Chris Blades*. **273**, 436, 118-C3 (1983)
- H I Clouds, H I Spin Temperatures. *Harvey S. Liszt*. **275**, 163, 138-G6 (1983)
- Radio Recombination Lines from Quasars. I. Level Populations of Hydrogenic Ions in a Strong, Nonthermal Radiation Field. *E. James Wadiak, Craig L. Sarazin, and Robert L. Brown*. **53**, 351, 21-E3 (1983) (Abstr. in **272**, 785, 110-C10)
- Stellar Chromospheres: H $\alpha$  and Ca II K Profiles. *D. M. Zarro and A. W. Rodgers*. **53**, 815, 27-G1 (1983) (Abstr. in **274**, 922, 135-E3)
- Luminosity Function**
- Studies of Luminous Stars in Nearby Galaxies. VIII. The Small Magellanic Cloud. *Roberta M. Humphreys*. **265**, 176, 14-A5 (1983)
- The Galactic Spheroid. *John N. Bahcall, Maarten Schmidt, and Raymond M. Soneira*. **265**, 730, 20-F6 (1983)
- The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger*. **266**, L73, 39-A4 (1983)
- Redshift Modifications to HEAO A-1 Cluster X-Ray Luminosities. *M. P. Kowalski, M. P. Ulmer, and R. G. Cruddace*. **268**, 540, 59-A1 (1983)
- Analysis of Complete Quasar Samples to Obtain Parameters of Luminosity and Evolution Functions. *H. L. Marshall, Y. Avni, H. Tananbaum, and G. Zamorani*. **269**, 35, 65-D2 (1983)
- Quasar Evolution Derived from the Palomar Bright Quasar Survey and Other Complete Quasar Surveys. *Maarten Schmidt and Richard F. Green*. **269**, 352, 70-B9 (1983)
- Luminosity Function of High-Redshift Quasars. *Barbara Gaston*. **272**, 411, 106-C5 (1983)
- First-ranked Galaxies in Groups. *Margaret J. Geller and Marc Postman*. **274**, 31, 124-C8 (1983)
- Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. *John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson*. **274**, 125, 125-C5 (1983)
- An Infrared Search for Very Low Mass Stars: The Luminosity Function. *Ronald G. Probst*. **274**, 237, 126-D5 (1983)
- Faint Stellar Photometry in Clusters. I. NGC 2204 and E3. *Jay A. Frogel and Bruce A. Twarog*. **274**, 270, 126-F11 (1983)
- Photometry of Resolved Galaxies. II. Sextans A. *J. G. Hoessel, R. A. Schommer, and G. E. Danielson*. **274**, 577, 131-E8 (1983)
- An X-Ray Survey of Globular Clusters and Their X-Ray Luminosity Function. *Paul Hertz and Jonathan E. Grindlay*. **275**, 105, 138-B13 (1983)
- Luminosity and Motion of Large Proper Motion Stars. II. Stars with Annual Proper Motion Larger than 0.7 Arc Seconds. *Olin J. Eggen*. **51**, 183, 4-A2 (1983) (Abstr. in **264**, 747, 10-D11)
- The Star-forming History of the Young Cluster NGC 2264. *M. T. Adams, K. M. Strom, and S. E. Strom*. **53**, 893, 29-A11 (1983) (Abstr. in **274**, 920, 135-E1)
- Magnetic Fields**
- The Magnetic Field on the RS Canum Venaticorum Star Lambda Andromedae. *Mark S. Giampapa, Leon Golub, and Simon P. Worden*. **268**, L121, 63-A10 (1983)
- VLBI Observations of the Radio Sources 0552+398 and 1848+283: Measurements of the Departure from Equipartition. *Steven R. Spangler, Robert L. Mutel, and John M. Benson*. **271**, 44, 88-D7 (1983)
- Scaling Laws for Hydrogen-like Atoms in Magnetic Fields of Arbitrary Strength. *J. M. Wadehra*. **271**, 879, 99-B1 (1983)
- Pair Production in Superstrong Magnetic Fields. *Joseph K. Daugherty and Alice K. Harding*. **273**, 761, 121-G11 (1983)
- Magnetic Reconnection Driven by Velocity Space Instabilities. *Bruno Coppi*. **273**, L101, 123-D8 (1983)
- X-Ray Emission of Late-Type Stars. *L. Paternò and F. Zuccarello*. **275**, L1, 141-F2 (1983)
- Magnetohydrodynamics: see Hydromagnetics**
- Masers**
- SiO Isotopic Maser Emission from VY Canis Majoris. *S. Deguchi, J. Good, Y. Fan, X. Mao, D. Wang, and Nobuharu Ukita*. **264**, L65, 11-C8 (1983)
- Water-Vapor Masers Located near Herbig-Haro Objects. *A. D. Haschick, J. M. Moran, L. F. Rodriguez, and P. T. P. Ho*. **265**, 281, 15-B13 (1983)
- Formation of OB Clusters: OH Maser Observations. *Paul T. P. Ho, Aubrey D. Haschick, Stuart N. Vogel, and Melvyn C. H. Wright*. **265**, 295, 15-C14 (1983)
- Collisional Rates for Vibrational-Rotational Transitions in Circumstellar SiO Masers. *Ronald J. Bieniek and Sheldon Green*. **265**, L29, 18-F12 (1983)
- The Molecular Cloud Complex Associated with ON I. *F. P. Israel and H. A. Wootten*. **266**, 580, 34-E10 (1983)
- Detection of  $J = 5-4$  SiO Masers in Late-Type Stars. *Dan P. Clemens and Adair P. Lane*. **266**, L117, 39-D5 (1983)
- SiS Maser Emission from IRC +10°216. *Christian Henkel, Henry E. Matthews, and Mark Morris*. **267**, 184, 42-A1 (1983)
- VLA Observations of the  $\nu_{11} = 3/2$  Masers Associated with Orion A. *S. S. Hansen and K. J. Johnston*. **267**, 625, 47-E13 (1983)
- Positions of the SiO Masers in Orion-KL: Anisotropy on a Scale of 70 AU. *M. C. H. Wright and R. L. Plambeck*. **267**, L115, 51-D4 (1983)
- Transfer of Polarized Radiation in Astronomical Masers. *L. R. Western and W. D. Watson*. **268**, 849, 62-D3 (1983)
- Collisional Rates for Vibrational-Rotational Transitions in Circumstellar SiO Masers: Erratum. *R. J. Bieniek and S. Green*. **270**, L101, 87-F9 (1983) (Orig. paper in **265**, L29, 18-F12)
- Type II OH/IR Masers. III. The Data Base. *Terry J. Jones, A. R. Hyland, and Ian Gatley*. **273**, 660, 120-G2 (1983)
- OH/IR Masers. IV. Evolution, Pulsation, and Nature of the Sources. *Terry J. Jones, A. R. Hyland, P. R. Wood, and Ian Gatley*. **273**, 669, 121-A1 (1983)
- Geometrical Effects on the Emission Properties of Astronomical Masers: Linear Polarization and Apparent Size. *L. R. Western and W. D. Watson*. **274**, 195, 126-A5 (1983)
- A Multilevel Model for Astronomical SiO Masers. *M. Elitzur, W. D. Watson, and L. R. Western*. **274**, 210, 126-B6 (1983)
- OH/IR Stars: Late Stages of Evolution of Intermediate-Mass Stars. *Teije de Jong*. **274**, 252, 125-E7 (1983)
- Circumstellar Envelope Structure of Late-Type Stars. *P. F. Bowers, K. J. Johnston, and J. H. Spencer*. **274**, 733, 133-

**Masers—Continued**

D4 (1983)

Linear Polarization of Astronomical Masers by Anisotropic Pumping and Its Enhancement Due to Geometry. *L. R. Western and W. D. Watson*. **275**, 195, 139-B11 (1983)

**Mass-Luminosity Relation**

Studies of Late-Type Dwarfs. V. Theoretical Models for Lower Main-Sequence Stars. *Don A. Vandenberg, F. D. A. Hartwick, P. Dawson, and David R. Alexander*. **266**, 747, 36-D12 (1983)

Accurate Radial Velocities for Carbon Stars in Draco and Ursa Minor: The First Hint of a Dwarf Spheroidal Mass-to-Light Ratio. *Marc Aaronson*. **266**, L11, 32-A12 (1983)

**Metal-Poor Stars: see Stars: Weak-Line****Meteors and Meteorites**

The *s*-Process and Allende Isotope Anomalies in Calcium and Titanium. *M. J. Harris*. **264**, 613, 9-A9 (1983)

The Isotopic Composition of Solar-Flare Noble Gases. *David C. Black*. **266**, 889, 38-A12 (1983)

Barium from a Mini *r*-Process in Supernovae. *D. Heymann*. **267**, 747, 49-A1 (1983)

Extinct Radioactivities: A Three-Phase Mixing Model. *Donald D. Clayton*. **268**, 381, 56-A12 (1983)

Discovery of *s*-Process Nd in Allende Residue. *Donald D. Clayton*. **271**, L107, 100-E3 (1983)

**Microwave Radiation: see Radio Sources****Mira Variables: see Stars: Long-Period Variables****Molecular Processes**

Magnetohydrodynamic Shock Waves in Molecular Clouds. *B. T. Draine, W. G. Roberge, and A. Dalgarno*. **264**, 485, 7-E11 (1983)

Molecular Self-Shielding in the Outflows from Late-Type Stars. *M. Morris and M. Jura*. **264**, 546, 8-C5 (1983)

On Photochemical Heating of Cometary Comae: The Cases of H<sub>2</sub>O and CO-rich Comets. *W.-H. Ip*. **264**, 726, 10-C4 (1983)

Laboratory and Astronomical Measurement of the Millimeter Wave Spectrum of the Ethynyl Radical CCH. *C. A. Gottlieb, E. W. Gottlieb, and P. Thaddeus*. **264**, 740, 10-D4 (1983)

Ab Initio Spin-Orbit Coupling Constants for Potential Exotic Interstellar Molecules. *David L. Cooper*. **265**, 808, 21-E8 (1983)

Lyman-Alpha Observations of Comets West 1976 VI and P/ D'Arrest 1976 XI with *Copernicus*. *M. C. Festou, H. U. Keller, J.-L. Bertaux, and E. S. Barker*. **265**, 925, 23-A1 (1983)

Collisional Rates for Vibrational-Rotational Transitions in Circumstellar SiO Masers. *Ronald J. Bieaniek and Sheldon Green*. **265**, L29, 18-F12 (1983)

The Kinetic Temperature and Density of the Sagittarius Molecular B2 Cloud from Observations of Methyl Cyanide. *Sally E. Cummins, Sheldon Green, P. Thaddeus, and R. A. Linke*. **266**, 331, 30-E4 (1983)

On Vibrational Excitations of Interstellar Molecules. *Moshe Elitzur*. **266**, 609, 35-A1 (1983)

Effects of a Shock on the Molecular Composition of a Diffuse Interstellar Cloud. *George F. Mitchell and Terry J. Deveau*. **266**, 646, 35-C12 (1983)

Theoretical Study of Silicon Dicarbid. *Sheldon Green*. **266**, 895, 38-B4 (1983)

Polarization of Interstellar Radio-Frequency Lines and Magnetic Field Direction. *Nikolaos D. Kylafis*. **267**, 137, 41-D8 (1983)

Further Analysis of the Possible Effects of Isotope-selective Photodissociation on Interstellar Carbon Monoxide. *Y.-H. Chu and W. D. Watson*. **267**, 151, 41-E8 (1983)

UV Radiation Field inside Dense Clouds: Its Possible Existence and Chemical Implications. *Sheo S. Prasad and Shankar P. Tarafdar*. **267**, 603, 47-D5 (1983)

Fluorescence Excitation of CO in Comets. *K. S. Krishna*

*Swamy*. **267**, 882, 50-D4 (1983)

Radiative Association and the Synthesis of Long Carbon Chain Molecules in Interstellar Clouds. *D. R. Bates*. **267**, L121, 51-D10 (1983)

Laboratory Measurement of the  $4_{00}-3_{13}$  70 GHz Transition of Ground-State Methylene (CH<sub>2</sub>). *F. J. Lovas, R. D. Suenram, and K. M. Evenson*. **267**, L131, 51-E5 (1983)

High-Resolution Spectra of C<sub>2</sub> Swan Bands from Comet West 1976 VI. *David L. Lambert and A. C. Danks*. **268**, 428, 56-E5 (1983)

Ultraviolet Continuum and H<sub>2</sub> Fluorescent Emission in Herbig-Haro Objects 43 and 47. *Richard D. Schwartz*. **268**, L37, 57-C14 (1983)

Laboratory Measurements of Ion-Molecule Reactions Pertaining to Interstellar Hydrocarbon Synthesis. *Eric Herbst, Nigel G. Adams, and David Smith*. **269**, 329, 68-F12 (1983)

Resonant and Nonresonant Processes in the Formation of CH<sup>+</sup> by Radiative Association. *M. M. Graff, J. T. Moseley, and E. Roueff*. **269**, 796, 75-B9 (1983)

Theory of Molecular Formation by Radiative Association in Interstellar Clouds. *D. R. Bates*. **270**, 564, 84-C9 (1983)

The Kinetic Theory of H<sub>2</sub> Dissociation. *Stephen Lepp and J. Michael Shull*. **270**, 578, 84-D9 (1983)

The Detection of H<sub>2</sub> in Cool Carbon Stars. *H. R. Johnson, J. H. Goebel, D. Goorvitch, and S. T. Ridgway*. **270**, L63, 87-C9 (1983)

Laboratory Measurement of the  $J = 2 \rightarrow 3$  Rotational Transition Frequency of HC<sup>13</sup>O<sup>+</sup>. *Grant M. Plummer, Eric Herbst, and Frank C. De Lucia*. **270**, L99, 87-F7 (1983)

Collisional Rates for Vibrational-Rotational Transitions in Circumstellar SiO Masers: Erratum. *R. J. Bieaniek and S. Green*. **270**, L101, 87-F9 (1983) (Orig. paper in **265**, L29, 18-F12)

Neutral Cometary Atmospheres. IV. Brightness Profiles in the Inner Coma of Comet Kahoutek 1973 XII. *A. H. Delsemme and M. R. Combi*. **271**, 388, 92-B12 (1983)

Primordial Star Formation: The Role of Molecular Hydrogen. *Francesco Palla, E. E. Salpeter, and Steven W. Stahler*. **271**, 632, 96-D6 (1983)

Observations of Interstellar C<sub>2</sub> toward Three Heavily Reddened Stars. *Barry L. Lutz and Richard M. Crutcher*. **271**, L101, 100-D12 (1983)

Association Reactions of Na<sup>+</sup> and Some Implications for Interstellar Chemistry. *David Smith, Nigel G. Adams, Erich Alge, and Eric Herbst*. **272**, 365, 105-A6 (1983)

A Theoretical Investigation of the Radiative Properties of the CN Red and Violet Systems. *Mats Larsson, Per E. M. Siegbahn, and Hans Ågren*. **272**, 369, 105-A10 (1983)

Synthesis of Chain Molecules in Regions with Partially Ionized Carbon. *Hiroko Suzuki*. **272**, 579, 108-B8 (1983)

Effect of Molecules and Grains on Rosseland Mean Opacities. *David R. Alexander, Hollis R. Johnson, and Roger L. Rypma*. **272**, 773, 110-B11 (1983)

The Atmosphere of a Dirty-Clathrate Cometary Nucleus: A Two-Phase, Multifluid Model. *M. L. Marconi and D. A. Mendis*. **273**, 381, 116-D5 (1983)

Monodeuterated Methane in the Outer Solar System. I. Spectroscopic Analysis of the Bands at 1.55 and 1.95 Microns. *Barry L. Lutz, C. de Bergh, and J. P. Maillard*. **273**, 397, 116-E7 (1983)

The Detection of Butadiynyl (C<sub>4</sub>H) in Absorption against Cassiopeia A. *M. B. Bell, P. A. Feldman, and H. E. Matthews*. **273**, L35, 117-D7 (1983)

<sup>13</sup>CH<sub>3</sub>D Rovibrational Intensities and the Jovian D/H Ratio. *C. Chackerian, Jr.* **273**, L47, 117-E3 (1983)

A Multilevel Model for Astronomical SiO Masers. *M. Elitzur, W. D. Watson, and L. R. Western*. **274**, 210, 126-B6 (1983)

Partition Functions and Dissociation Constraints for Zirconium Oxide. *A. Shankar and J. E. Littleton*. **274**, 916, 135-D11 (1983)

- The Discovery of  $S_2$  in Comet Iras-Araki-Alcock 1983d. *Michael F. A'Hearn, Paul D. Feldman, and David G. Schleicher*. **274**, L99, 136-E2 (1983)
- A Search for  $^2H$ ,  $N=1$ ,  $J=3/2$  Lambda-Doubling Transitions of  $CH$ . *L. M. Ziurys, C. Henkel, and R. J. Saykally*. **275**, 175, 139-A4 (1983)
- Mass Loss Rates and Anisotropies in the Outflows from Late-Type Stars. *M. Jura*. **275**, 683, 145-A8 (1983)
- Laboratory Detection of the  $C_3N$  and  $C_4H$  Free Radicals. *C. A. Gottlieb, E. W. Gottlieb, P. Thaddeus, and H. Kawamura*. **275**, 916, 147-E3 (1983)
- Curves for Analysis of the Two Lowest Rotational Transitions of Carbon Monoxide Using the Large Velocity Gradient Radiative Transfer Model. *Paul F. Goldsmith, Judith S. Young, and William D. Langer*. **51**, 203, 4-C1 (1983) (Abstr. in **264**, 748, 10-D12)
- Fourier Spectroscopy of the  $^{12}C_2$ ,  $^{13}C_2$ , and  $^{12}C^{13}C(0-0)$  Swan Bands. *C. Amiot*. **52**, 329, 14-A2 (1983) (Abstr. in **269**, 808, 75-C7)
- The Emission Spectrum of Yttrium Monoxide: New Rotational and Vibrational Results on the  $A^2\Pi-X^2\Sigma^+$  System. *A. Bernard and R. Gravina*. **52**, 443, 16-D1 (1983) (Abstr. in **270**, 780, 86-E7)
- Ion-Molecule Syntheses of Interstellar Molecular Hydrocarbons through  $C_3H$ : Toward Molecular Complexity. *Eric Herbst*. **53**, 41, 17-D3 (1983) (Abstr. in **271**, 890, 99-B12)
- Moon**
- The Isotopic Composition of Solar-Flare Noble Gases. *David C. Black*. **266**, 889, 38-A12 (1983)
- Nebulae: Abundances**
- Do the W44 and W28 Molecular Clouds Show Evidence of a Shock? *L. K. DeNoyer*. **264**, 141, 2-D9 (1983)
- A Photometric Survey of Compact and Selected Planetary Nebulae. *James B. Kaler*. **264**, 594, 8-F13 (1983)
- The Planetary Nebula IC 3568: A Model Based on IUE Observations. *J. Patrick Harrington and Walter A. Feibelman*. **265**, 258, 15-A4 (1983)
- The Galactic Gradient in Electron Temperature from Observations of Low-Density  $H II$  Regions. *Guido Garay and Luis F. Rodríguez*. **266**, 263, 29-G1 (1983)
- The Hydrogen-depleted Planetary Nebulae Abell 30 and Abell 78. *George H. Jacoby and Holland C. Ford*. **266**, 298, 30-B13 (1983)
- X-Ray Ionization and the Orion Molecular Cloud. *Julian H. Krolik and Timothy R. Kallman*. **267**, 610, 47-D12 (1983)
- The Ionization Structure of Planetary Nebulae. III. NGC 7009. *Timothy Barker*. **267**, 630, 47-F4 (1983)
- The Effects of Mass and Metallicity upon Planetary Nebula Formation. *K. A. Papp, C. R. Purton, and S. Kwok*. **268**, 145, 53-E9 (1983)
- PL 1547.3 - 5612: A Pure Nitrogen Ring Nebula. *María Teresa Ruiz*. **268**, L103, 63-G4 (1983)
- Dense Cores in Dark Clouds. IV.  $HC_3N$  Observations. *P. J. Benson and P. C. Myers*. **270**, 589, 84-E6 (1983)
- Sulfur Abundances in Three Halo Planetary Nebulae. *Timothy Barker*. **270**, 641, 85-B5 (1983)
- Determinations of  $S III$ ,  $O IV$ , and  $Ne V$  Abundances in Planetary Nebulae from Infrared Lines. *M. A. Shure, T. Herter, J. R. Houck, D. A. Briotta, Jr., W. J. Forrest, G. E. Gull, and J. F. McCarthy*. **270**, 645, 85-B9 (1983)
- The Evolution of Large Planetary Nebulae and Their Central Stars. *James B. Kaler*. **271**, 188, 90-A9 (1983)
- A Far-Infrared Study of the  $N/O$  Abundance Ratio in Galactic  $H II$  Regions. *Daniel F. Lester, Harriet L. Dinerstein, Michael W. Werner, Dan M. Watson, and Reinhard L. Genzel*. **271**, 618, 96-C6 (1983)
- The Detection of Vinyl Cyanide in TMC-1. *Henry E. Matthews and Trevor J. Sears*. **272**, 149, 102-F2 (1983)
- The Kinetic Temperature and  $CH_3CCH$  Column Density Profiles in Sgr B2, Orion, and DR 21. *E. Churchwell and J. M. Hollis*. **272**, 591, 108-C6 (1983)
- Isotopic Fractionation and Mass Motion in Giant Molecular Clouds. *A. A. Penzias*. **273**, 195, 114-C14 (1983)
- The Abundance of Carbon in Planetary Nebulae. *Howard B. French*. **273**, 214, 114-E5 (1983)
- A Spectroscopic Study of Some Planetary Nebulae in the Large Magellanic Cloud. *Lawrence H. Aller*. **273**, 590, 120-A8 (1983)
- The Unique Cometary Nebula Parsamian 13. *Martin Cohen, D. K. Aitkin, P. F. Roche, and P. M. Williams*. **273**, 624, 120-D2 (1983)
- Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wootten, C. Masson, and M. A. Frerking*. **273**, 633, 120-D13 (1983)
- The Effect of Heavy Element Opacity on the Structure of  $H II$  Regions. *Robert H. Rubin*. **274**, 671, 132-F12 (1983)
- The Circumstellar and Nebular Environment of the Becklin-Neugebauer Object:  $\lambda = 2-5$  Micron Spectroscopy. *N. Scofield, S. G. Kleinmann, D. N. B. Hall, and S. T. Ridgway*. **275**, 201, 139-C3 (1983)
- The Structure and Emission Spectrum of a Nonradiative Shock Wave in the Cygnus Loop. *J. C. Raymond, W. P. Blair, R. A. Fesen, and T. R. Gull*. **275**, 636, 144-E3 (1983)
- IUE Spectrum of the Io Torus: Identification of the  $S_2 \rightarrow ^2P_{3/2}$  Transitions of  $S III$ . *H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou*. **275**, L19, 141-G4 (1983)
- Chemical Compositions of Planetary Nebulae. *Lawrence H. Aller and Stanley J. Czyzak*. **51**, 211, 4-D1 (1983) (Abstr. in **264**, 747, 10-D11)
- Nebulae: Crab Nebula**
- Hard X-Ray Observations of the Crab Nebula and A0535 + 26 with a High Energy Resolution Spectrometer. *J. M. Hammeury, D. Boclet, Ph. Durouchoux, T. L. Cline, W. S. Paciesas, B. J. Teegarden, J. Tueller, and R. C. Haymes*. **270**, 144, 78-D14 (1983)
- Discovery of Large Radial Velocities in the Supernova Remnant 3C 58. *Robert A. Fesen*. **270**, L53, 87-B13 (1983)
- Nebulae: General**
- The Relation between Magnetic Field and Gas Density in Interstellar Clouds. *Robert L. Brown and Chong-An Chang*. **264**, 134, 2-D2 (1983)
- Protostellar Rotation: Turbulence and Heating of Molecular Clouds. *José Franco*. **264**, 508, 7-G6 (1983)
- Dense Cores in Dark Clouds. I. CO Observations and Column Densities of High-Extinction Regions. *P. C. Myers, Richard A. Linke, and P. J. Benson*. **264**, 517, 8-A1 (1983)
- The High-Velocity Molecular Flows near Young Stellar Objects. *John Bally and Charles J. Lada*. **265**, 824, 21-F10 (1983)
- Dense Cores in Dark Clouds. II.  $NH_3$  Observations and Star Formation. *P. C. Myers and P. J. Benson*. **266**, 309, 30-C10 (1983)
- $J = 2-1$  CO Observations of Molecular Clouds with High-Velocity Gas: Evidence for Clumpy Outflows. *Richard L. Plambeck, Ronald L. Snell, and Robert B. Loren*. **266**, 321, 30-D8 (1983)
- The Acceleration of Molecular Hydrogen Clouds through Radiative Dissociation. *Martin Harwit and Johannes Schmid-Burgk*. **266**, 602, 34-G6 (1983)
- Optical Confirmation of a Very Compact Bipolar Nebula Associated with the Symbiotic Star V1016 Cygni. *Joseph Solf*. **266**, L113, 39-C12 (1983)
- Structure of Dense Molecular Gas in TMC 1 from Observations of Three Transitions of  $HC_3N$ . *F. Peter Schloerb, Ronald L. Snell, and Judith S. Young*. **267**, 163, 41-F7 (1983)

**Nebulae: General—Continued**

- An Energetic, Bisymmetrically Expanding H I Remnant. *Felix J. Lockman and B. L. Ganzel*. **268**, 117, 53-B11 (1983)
- The Equilibria of Rotating, Isothermal Clouds. I. Method of Solution. *Steven W. Stahler*. **268**, 155, 53-F5 (1983)
- The Equilibria of Rotating, Isothermal Clouds. II. Structure and Dynamical Stability. *Steven W. Stahler*. **268**, 165, 53-G1 (1983)
- Nova Shells. *Judith G. Cohen and Ann J. Rosenthal*. **268**, 689, 60-F5 (1983)
- Simulation Models for the Evolution of Cloud Systems. I. Introduction and Preliminary Simulations. *William A. Pumphrey and John M. Scalo*. **269**, 531, 72-C4 (1983)
- Dense Cores in Dark Clouds. III. Subsonic Turbulence. *P. C. Myers*. **270**, 105, 78-B4 (1983)
- A Survey of High-Velocity Molecular Gas in the Vicinity of Herbig-Haro Objects. I. *Suzan Edwards and Ronald L. Snell*. **270**, 605, 84-F8 (1983)
- A Gravitationally Stable Bok Globule. *R. L. Dickman and Dan P. Clemens*. **271**, 143, 89-E1 (1983)
- Herbig-Haro Objects in the Dust Globule ESO 210-6A. *J. A. Graham and J. H. Elias*. **272**, 615, 108-E2 (1983)
- Ambipolar Diffusion in Self-gravitating Isothermal Layers. *Frank H. Shu*. **273**, 202, 114-D7 (1983)
- Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? *José M. Torrelles, Luis F. Rodríguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho*. **274**, 214, 126-B10 (1983)
- Linear Polarization of Interstellar Radio-Frequency Absorption Lines and Magnetic Field Direction. *Nikolaos D. Kylafis*. **275**, 135, 138-E4 (1983)
- Curves for Analysis of the Two Lowest Rotational Transitions of Carbon Monoxide Using the Large Velocity Gradient Radiative Transfer Model. *Paul F. Goldsmith, Judith S. Young, and William D. Langer*. **51**, 203, 4-C1 (1983) (Abstr. in **264**, 748, 10-D12)
- Regions of Low Molecular Column Density Near the Galactic Plane. *F. Verter, G. R. Knapp, A. A. Stark, and R. W. Wilson*. **52**, 289, 13-D8 (1983) (Abstr. in **269**, 809, 75-C8)

**Nebulae: H II Regions**

- The 157 Micron [C II] Emission from NGC 2024: Core and Halo Components. *Noel L. Kurtz, Scott D. Smyers, Ray W. Russell, Martin Harwit, and Gary Melnick*. **264**, 538, 8-B11 (1983)
- The Spatial Distribution of H II Regions in NGC 4321. *Scott Anderson, Paul Hodge, and Robert C. Kennicutt, Jr.* **265**, 132, 13-E2 (1983)
- Modeling of G333.6-0.2 as a Spherical H II Region. *Robert H. Rubin, David J. Hollenbach, and Edwin F. Erickson*. **265**, 239, 14-F13 (1983)
- Formation of OB Clusters: OH Maser Observations. *Paul T. P. Ho, Aubrey D. Haschick, Stuart N. Vogel, and Melvyn C. H. Wright*. **265**, 295, 15-C14 (1983)
- Ionized Gas in Active Molecular Cloud Cores. *John Bally and Read Predmore*. **265**, 778, 21-C3 (1983)
- An Optical Study of IC 1470. *Beverly T. Lynds and Earl J. O'Neil, Jr.* **265**, 803, 21-E1 (1983)
- The Galactic Gradient in Electron Temperature from Observations of Low-Density H II Regions. *Guido Garay and Luis F. Rodríguez*. **266**, 263, 29-G1 (1983)
- X-Ray and Ultraviolet Observations of Extragalactic H II Regions. *G. Fabbiano and N. Panagia*. **266**, 568, 34-D12 (1983)
- The Molecular Cloud Complex Associated with ON 1. *F. P. Israel and H. A. Wooten*. **266**, 580, 34-E10 (1983)
- VLA Observations of Warm NH<sub>3</sub> Associated with Mass Outflows in W51. *Paul T. P. Ho, Reinhard Genzel, and Anirudha Das*. **266**, 596, 34-F14 (1983)
- Infrared Spectroscopy of the Sources in S235 and Its Implication for the Line Excess Problem. *Rodger I. Thompson, Harley A. Thronson, Jr., and Bel Campbell*. **266**, 614, 35-A6 (1983)
- Infrared Line and Radio Continuum Emission of Circumstellar Ionized Regions. *M. Simon, M. Felli, L. Cassar, J. Fischer, and M. Massi*. **266**, 623, 35-B1 (1983)
- Nebular Dust and Extinction in Ionized Nebulae. I. The Balmer Decrement. *John S. Mathis*. **267**, 119, 41-C4 (1983)
- The Nature of NML Cygnus. *M. Morris and M. Jura*. **267**, 179, 41-G9 (1983)
- The Radial Distribution of H II Regions in Spiral Galaxies. *P. W. Hodge and R. C. Kennicutt, Jr.* **267**, 563, 47-A5 (1983)
- Formation of OB Clusters: W33 Complex. *Aubrey D. Haschick and Paul T. P. Ho*. **267**, 638, 47-F13 (1983)
- Blue Compact Dwarf Galaxies. II. Near-Infrared Studies and Stellar Populations. *Trinh X. Thuan*. **268**, 667, 60-D11 (1983)
- Interstellar H $\alpha$  Emission along the Galactic Equator. *R. J. Reynolds*. **268**, 698, 60-G1 (1983)
- VLA Observations of Massive Star Formation in Spiral Nuclei. *J. L. Turner and P. T. P. Ho*. **268**, L79, 63-E10 (1983)
- The Structure of Bright-rimmed Molecular Clouds. *Alwyn Wootten, Annela Sargent, Gillian Knapp, and P. J. Hugrins*. **269**, 147, 66-F4 (1983)
- A Study in H $\alpha$  Velocities in NGC 1499, NGC 7000, and IC 1318B/C. *W. F. Fountain, G. A. Gary, and C. R. O'Dell*. **269**, 164, 66-G7 (1983)
- The M17 SW Molecular Cloud. *Harley A. Thronson, Jr. and Charles J. Lada*. **269**, 175, 67-A4 (1983)
- Ring Nebulae Associated with Wolf-Rayet Stars in the Large Magellanic Cloud. III. Kinematics of DEM 39, 231, 240, and 315. *You-Hua Chu*. **269**, 202, 67-D1 (1983)
- Infrared Observations of OB Star Formation in NGC 6334. *Paul M. Harvey and Ian Gatley*. **269**, 613, 73-B5 (1983)
- The Spectral and Spatial Distribution of Radiation from Eta Carinae. III. A High-Resolution 2.2 Micron Map and Morphological Considerations of the Evolutionary Status. *R. M. Mitchell, G. Robinson, A. R. Hyland, and T. J. Jones*. **271**, 133, 89-D5 (1983)
- A 10 Micron Survey of Star Formation in Galactic Nuclei: Virgo Spiral Galaxies. *N. Z. Scoville, E. E. Becklin, Judith S. Young, and R. W. Capps*. **271**, 512, 95-B3 (1983)
- A Far-Infrared Study of the N/O Abundance Ratio in Galactic H II Regions. *Daniel F. Lester, Harriet L. Dinerstein, Michael W. Werner, Dan M. Watson, and Reinhard L. Genzel*. **271**, 618, 96-C6 (1983)
- Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck*. **271**, L31, 93-C3 (1983)
- Star Formation within OB Subgroups: Implosion by Multiple Sources. *Richard I. Klein, Maxwell T. Sandford II, and Rodney W. Whitaker*. **271**, L69, 100-B12 (1983)
- Radio Images of the Bipolar H II Region S106. *John Bally, Ronald L. Snell, and Read Predmore*. **272**, 154, 102-F7 (1983)
- An H $\alpha$  Velocity Study of S252. *W. F. Fountain, G. Allen Gary, and C. R. O'Dell*. **273**, 639, 120-E5 (1983)
- Gas Kinematics and the Structures of Extragalactic Giant and Supergiant H II Regions. *J. S. Gallagher and Deidre A. Hunter*. **274**, 141, 125-D7 (1983)
- H II Regions and Star Formation in M83 and M33. *K. S. Rumstay and Michele Kaufman*. **274**, 611, 132-B3 (1983)
- Inhomogeneities in the Bubble Nebula, NGC 7635. *Beverly T. Lynds and Earl J. O'Neil, Jr.* **274**, 650, 132-E1 (1983)
- The Effect of Heavy Element Opacity on the Structure of H II Regions. *Robert H. Rubin*. **274**, 671, 132-F12 (1983)
- Radiatively Induced Star Formation. *T. N. LaRosa*. **274**, 815, 134-C5 (1983)
- The Brighter 94 Micron Sources Observed by the Far-Infrared Sky Survey Experiment. *Stephan D. Price, K. Shivanandan, Thomas L. Murdock, and Phillip F. Bowers*. **275**, 125, 138-D8 (1983)



- An Ionization Gradient across the Front of M17 SW. *Daniel F. Lester, Harriet L. Dinerstein, David M. Rank, and Diane H. Wooden.* **275**, 130, 138-D13 (1983)
- The Circumstellar and Nebular Environment of the Becklin-Neugebauer Object:  $\lambda = 2-5$  Micron Spectroscopy. *N. Scoville, S. G. Kleinmann, D. N. B. Hall, and S. T. Ridgway.* **275**, 201, 139-C3 (1983)
- IUE Observations of the Exciting Stars of Giant H II Regions in M33: Supermassive Stars? *Philip Massey and J. B. Hutchings.* **275**, 578, 143-G9 (1983)
- The Kinematics and Structure of N63A and Associated H II Regions. *Peter Shull, Jr.* **275**, 592, 144-A9 (1983)
- The Case Low-Dispersion Northern Sky Survey. I. *Peter Pesch and N. Sanduleak.* **51**, 171, 3-D1 (1983) (Abstr. in **263**, 1006, 142-F7)
- An H $\alpha$  [N II] Survey of the Nuclei of a Complete Sample of Spiral Galaxies. *William Keel.* **52**, 229, 12-F8 (1983) (Abstr. in **269**, 810, 75-C9)
- Felicity Fields in Late-Type Galaxies from H $\alpha$  Fabry-Perot Interferometry. IV. Kinematics and Dynamics of the SAB(s)c Spiral NGC 5236 (M83). *G. de Vaucouleurs, W. D. Pence, and E. Davoust.* **53**, 17, 17-B6 (1983) (Abstr. in **271**, 889, 99-B11)
- A Study of Low Surface Brightness Spiral Galaxies. II. Optical Surface Photometry, Infrared Photometry, and H II Region Spectrophotometry. *W. Romanishin, K. M. Strom, and S. E. Strom.* **53**, 105, 18-A10 (1983) (Abstr. in **271**, 892, 99-B14)
- Galactic Ring Nebulae Associated with Wolf-Rayet Stars. VIII. Summary and Atlas. *You-Hua Chu, Richard R. Treffers, and Karen B. Kwitter.* **53**, 937, 29-F8 (1983) (Abstr. in **274**, 923, 135-E4)
- Nebulae: Individual** (arranged by Messier number, NGC number, and by other Designation)
- By Messier Number*
- IR Maps of M17 in the [O III] 88 Micron and 52 Micron Lines and [N III] 57 Micron Line Measurements. *R. J. Emery, D. A. Naylor, B. Fitton, I. Furniss, R. E. Jennings, and K. J. King.* **268**, 721, 61-A12 (1983)
- The M17 SW Molecular Cloud. *Harley A. Thronson, Jr. and Charles J. Lada.* **269**, 175, 67-A4 (1983)
- An Ionization Gradient across the Front of M17 SW. *Daniel F. Lester, Harriet L. Dinerstein, David M. Rank, and Diane H. Wooden.* **275**, 130, 138-D13 (1983)
- By NGC Number*
- A Study in H $\alpha$  Velocities in NGC 1499, NGC 7000, and IC 1318B/C. *W. F. Fountain, G. A. Gary, and C. R. O'Dell.* **269**, 164, 66-G7 (1983)
- The 157 Micron [C II] Emission from NGC 2024: Core and Halo Components. *Noel L. Kurtz, Scott D. Smyers, Ray W. Russell, Martin Harwit, and Gary Melnick.* **264**, 538, 8-B11 (1983)
- IUE Observations of the Perplexing Bipolar Planetary Nebula NGC 2346. *Walter A. Feibelman and Lawrence H. Aller.* **270**, 150, 78-E6 (1983)
- Infrared Observations of OB Star Formation in NGC 6334. *Paul M. Harvey and Ian Gatley.* **269**, 613, 73-B5 (1983)
- [NGC 6720] Two-Dimensional Photometry of Planetary Nebulae. *Peter N. Kupferman.* **266**, 689, 35-F13 (1983)
- Distribution of Forbidden Neutral Carbon Emission in the Ring Nebula (NGC 6720). *D. C. Jewitt, P. N. Kupferman, G. E. Danielson, and S. P. Maran.* **268**, 683, 60-E13 (1983)
- [NGC 6992] Digital Analysis of Narrow-Band Imagery of the Cygnus Loop. *J. Jeff Hester, Robert A. R. Parker, and Reginald J. Dufour.* **273**, 219, 114-E10 (1983)
- A Study in H $\alpha$  Velocities in NGC 1499, NGC 7000, and IC 1318B/C. *W. F. Fountain, G. A. Gary, and C. R. O'Dell.* **269**, 164, 66-G7 (1983)
- The Ionization Structure of Planetary Nebulae. III. NGC 7009. *Timothy Barker.* **267**, 630, 47-F4 (1983)
- High-Resolution Near-Infrared and Millimeter-Wave Spectroscopy of NGC 7027. *Harley A. Thronson, Jr.* **264**, 599, 8-G5 (1983)
- Observations of NGC 7027 from 5.2 to 7.5 Microns: The Detection of Ni II and Additional Dust Features. *J. D. Bregman, H. L. Dinerstein, J. H. Goebel, D. F. Lester, F. C. Witteborn, and D. M. Rank.* **274**, 666, 132-F7 (1983)
- Inhomogeneities in the Bubble Nebula, NGC 7635. *Beverly T. Lynds and Earl J. O'Neil, Jr.* **274**, 650, 132-E1 (1983)
- [NGC 7662] Two-Dimensional Photometry of Planetary Nebulae. *Peter N. Kupferman.* **266**, 689, 35-F13 (1983)
- By Other Designation: Names*
- The Precataclysmic Nucleus of Abell 41. *Albert D. Grauer and Howard E. Bond.* **271**, 259, 90-G5 (1983)
- The Hydrogen-depleted Planetary Nebulae Abell 30 and Abell 78. *George H. Jacoby and Holland C. Ford.* **266**, 298, 30-B13 (1983)
- The Hydrogen-depleted Planetary Nebulae Abell 30 and Abell 78. *George H. Jacoby and Holland C. Ford.* **266**, 298, 30-B13 (1983)
- The Spectral and Spatial Distribution of Radiation from Eta Carinae. III. A High-Resolution 2.2 Micron Map and Morphological Considerations of the Evolutionary Status. *R. M. Mitchell, G. Robinson, A. R. Hyland, and T. J. Jones.* **271**, 133, 89-D5 (1983)
- Optical Studies of Cassiopeia A. VI. Observations during the Period 1976-1980. *Sidney van den Bergh and Karl W. Kamper.* **268**, 129, 53-C9 (1983)
- High-Velocity, Asymmetric Doppler Shifts of the X-Ray Emission Lines of Cassiopeia A. *T. H. Markert, C. R. Canizares, G. W. Clark, and P. F. Winkler.* **268**, 134, 53-D12 (1983)
- Molecular Clouds on the Threshold of Star Formation: The Radial Density Profile of the Cores of the Rho Ophiuchi and R Coronae Australis Clouds. *Robert B. Loren, Aa. Sandkvist, and A. Wootten.* **270**, 620, 84-G9 (1983)
- The Nature of NML Cygnus. *M. Morris and M. Jura.* **267**, 179, 41-G9 (1983)
- On the Geometrical and Kinematic Structure of the Postnova Shell of HR Delphini. *Joseph Solf.* **273**, 647, 120-F1 (1983)
- Infrared Observations of R136, the Central Object of the 30 Doradus Nebula. *Nino Panagia, Enrico G. Tanzi, and Massimo Tarengi.* **272**, 123, 102-D4 (1983)
- The Nature of R136a, the Superluminous Central Object of the 30 Doradus Nebula. *Blair D. Savage, Edward L. Fitzpatrick, Joseph P. Cassinelli, and Dennis C. Ebbets.* **273**, 597, 120-B1 (1983)
- Magnetic Field Structure in the Gum Nebula Area. *J. P. Vallée and R. C. Bignell.* **272**, 131, 102-D12 (1983)
- Linear Polarization Observations in Selected Celestial Zones: The Gum Nebula Area. *R. C. Bignell and J. P. Vallée.* **53**, 147, 18-D9 (1983) (Abstr. in **271**, 893, 99-C1)
- The Ionization Equilibrium inside the Rho Ophiuchi Cloud. *Theodore P. Snow, Jr.* **266**, 576, 34-E6 (1983)
- Einstein Observations of the Rho Ophiuchi Dark Cloud: An X-Ray Christmas Tree. *Thierry Montmerle, Lydie Koch-Miramond, Edith Falgarone, and Jonathan E. Grindlay.* **269**, 182, 67-A11 (1983)
- Molecular Clouds on the Threshold of Star Formation: The Radial Density Profile of the Cores of the Rho Ophiuchi and R Coronae Australis Clouds. *Robert B. Loren, Aa. Sandkvist, and A. Wootten.* **270**, 620, 84-G9 (1983)
- [ $\rho$  Ophiuchi] The Discovery of New Embedded Sources in the Centrally Condensed Core of the Rho Ophiuchi Dark Cloud: The Formation of a Bound Cluster? *Bruce A. Wilking and Charles J. Lada.* **274**, 698, 133-A11 (1983)
- [SN Ophiuchi 1604] The X-Ray Surface Brightness of Kepler's Supernova Remnant. *Richard L. White and Knox S. Long.* **264**, 196, 3-A10 (1983)
- The Unique Cometary Nebula Parsamian 13. *Martin Cohen,*

**Nebulae: Individual—Continued**

- D. K. Aitkin, P. F. Roche, and P. M. Williams. **273**, 624, 120-D2 (1983)
- Velocity Dispersions of Knots in Vela X and Puppis A. *Peter Shull, Jr.* **269**, 218, 67-E5 (1983)
- [Red Rectangle] Molecular Emission Bands in the Ultraviolet Spectrum of the Red Rectangle Star HD 44179. *Michael L. Sitko.* **265**, 848, 22-A10 (1983)
- The Kinetic Temperature and Density of the Sagittarius Molecular B2 Cloud from Observations of Methyl Cyanide. *Sally E. Cummins, Sheldon Green, P. Thaddeus, and R. A. Linke.* **266**, 331, 30-E4 (1983)
- [Taurus Dark Cloud Complex] CN in Dark Clouds. *Ed Churchwell and John H. Bieging.* **265**, 216, 14-D14 (1983)
- [Taurus Molecular Cloud] The Detection of Vinyl Cyanide in TMC-1. *Henry E. Matthews and Trevor J. Sears.* **272**, 149, 102-F2 (1983)
- The Soft X-Ray Spectrum of the Vela Supernova Remnant. *Steven M. Kahn, Jean Brodie, Stuart Bowyer, and Philip A. Charles.* **269**, 212, 67-D12 (1983)
- Velocity Dispersions of Knots in Vela X and Puppis A. *Peter Shull, Jr.* **269**, 218, 67-E5 (1983)
- Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wootten, C. Masson, and M. A. Frerking.* **273**, 633, 120-D13 (1983)
- By Other Designation: Alphanumeric*
- Modeling of G333.6–0.2 as a Spherical H II Region. *Robert H. Rubin, David J. Hollenbach, and Edwin F. Erickson.* **265**, 239, 14-F13 (1983)
- [IC 443] Effects of a Shock on the Molecular Composition of a Diffuse Interstellar Cloud. *George F. Mitchell and Terry J. Deveau.* **266**, 646, 35-C12 (1983)
- A Study in Ha Velocities in NGC 1499, NGC 7000, and IC 1318B/C. *W. F. Fountain, G. A. Gary, and C. R. O'Dell.* **269**, 164, 66-G7 (1983)
- An Optical Study of IC 1470. *Beverly T. Lynds and Earl J. O'Neil, Jr.* **265**, 803, 21-E1 (1983)
- The Planetary Nebula IC 3568: A Model Based on IUE Observations. *J. Patrick Harrington and Walter A. Feibelman.* **265**, 258, 15-A4 (1983)
- The Binary Central Star of the Planetary Nebula LT-5. *Walter A. Feibelman and James B. Kaler.* **269**, 592, 72-G11 (1983)
- MSH 15–52: A Supernova Remnant Containing Two Compact X-Ray Sources. *F. D. Seward, F. R. Harnden, Jr., P. Murdin, and David H. Clark.* **267**, 698, 48-D4 (1983)
- Ultraviolet Observations of M1–2 (= VV 8). *Walter A. Feibelman.* **275**, 628, 144-D9 (1983)
- The Kinematics and Structure of N49. *Peter Shull, Jr.* **275**, 611, 144-C2 (1983)
- The Kinematics and Structure of N63A and Associated H II Regions. *Peter Shull, Jr.* **275**, 592, 144-A9 (1983)
- PL 1547.3–5612: A Pure Nitrogen Ring Nebula. *Maria Teresa Ruiz.* **268**, L103, 63-G4 (1983)
- The Central X-Ray Source in RCW 103: Evidence for Blackbody Emission. *I. R. Tuohy, G. P. Garmire, R. N. Manchester, and M. A. Dopita.* **268**, 778, 61-E14 (1983)
- The Infrared Echo of a Type II Supernova with a Circumstellar Dust Shell: Applications to SN 1979c and SN 1980k. *Eliahu Dwek.* **274**, 175, 125-F13 (1983)
- The Infrared Echo of a Type II Supernova with a Circumstellar Dust Shell: Applications to SN 1979c and SN 1980k. *Eliahu Dwek.* **274**, 175, 125-F13 (1983)
- A Large Molecular Cloud toward the SNR W50 and SS 433. *Y.-L. Huang, T. M. Dame, and P. Thaddeus.* **272**, 609, 108-D10 (1983)
- Radio Images of the Bipolar H II Region S106. *John Bally, Ronald L. Snell, and Read Predmore.* **272**, 154, 102-F7 (1983)
- Far-Infrared and Submillimeter Observations of Stellar Ra-

- diative and Wind Heating in S140 IRS. *P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles.* **271**, 625, 96-C13 (1983)
- An Ha Velocity Study of S252. *W. F. Fountain, G. Allen Gary, and C. R. O'Dell.* **273**, 639, 120-E5 (1983)
- Ultraviolet Observations of M1–2 (= VV 8). *Walter A. Feibelman.* **275**, 628, 144-D9 (1983)
- VLA Continuum and OH Line Emission Observations of the Compact Nebula VY2–2. *E. R. Seaquist and L. E. Davis.* **274**, 659, 132-E14 (1983)
- High-Resolution Radio and X-Ray Observations of the Supernova Remnant W28. *M. D. Andrews, J. P. Basart, R. C. Lamb, and R. H. Becker.* **266**, 684, 35-F8 (1983)
- Do the W44 and W28 Molecular Clouds Show Evidence of a Shock? *L. K. DeNoyer.* **264**, 141, 2-D9 (1983)
- Molecular Gas in the W33 Region. *Paul F. Goldsmith and Xijie Mao.* **265**, 791, 21-D2 (1983)
- Formation of OB Clusters: W33 Complex. *Aubrey D. Haschick and Paul T. P. Ho.* **267**, 638, 47-F13 (1983)
- Do the W44 and W28 Molecular Clouds Show Evidence of a Shock? *L. K. DeNoyer.* **264**, 141, 2-D9 (1983)
- Kinematics of the Optical Filaments in W50. *Tsevi Mazeh, Luis A. Aguilar, Richard R. Treffers, Arieh König, and Linda S. Sparke.* **265**, 235, 14-F5 (1983)
- A Large Molecular Cloud toward the SNR W50 and SS 433. *Y.-L. Huang, T. M. Dame, and P. Thaddeus.* **272**, 609, 108-D10 (1983)
- VLA Observations of Warm NH<sub>3</sub> Associated with Mass Outflows in W51. *Paul T. P. Ho, Reinhard Genzel, and Anirudha Das.* **266**, 596, 34-F14 (1983)
- A Rotating Protocluster in W58: HCO<sup>+</sup> Aperture Synthesis Maps. *S. N. Vogel and W. J. Welch.* **269**, 568, 72-F1 (1983)
- Discovery of Large Radial Velocities in the Supernova Remnant 3C 58. *Robert A. Fesen.* **270**, L53, 87-B13 (1983)
- Nebulae: Orion Nebula**
- Observations of the Extinction and Excitation of the Molecular Hydrogen Emission in Orion. *S. Beckwith, Neal J. Evans II, I. Gatley, G. Gull, and R. W. Russell.* **264**, 152, 2-E6 (1983)
- Observations of Sulfur Dioxide in the Kleinmann-Low Nebula. *F. Peter Schloerb, Per Friberg, Åke Hjalmarson, Bertil Höglund, and William M. Irvine.* **264**, 161, 2-F1 (1983)
- Methanol in Orion A: Simultaneous Observations of Corresponding Rotational Transitions in the Ground and Torsionally Excited States. *J. M. Hollis, F. J. Lovas, R. D. Suenram, P. R. Jewell, and L. E. Snyder.* **264**, 543, 8-C2 (1983)
- Small Rotating Clouds of Stellar Mass in Orion Molecular Cloud 1. *Andrew Harris, C. H. Townes, D. N. Matsakis, and Patrick Palmer.* **265**, L63, 26-C6 (1983)
- Atomic Hydrogen Associated with the High-Velocity Flow in NGC 2071. *John Bally and Antony A. Stark.* **266**, L61, 32-D13 (1983)
- X-Ray Ionization and the Orion Molecular Cloud. *Julian H. Krolik and Timothy R. Kallman.* **267**, 610, 47-D12 (1983)
- VLA Observations of the  $\pi_{3,2}J = 3/2$  Masers Associated with Orion A. *S. S. Hansen and K. J. Johnston.* **267**, 625, 47-E13 (1983)
- Source of the High-Velocity Molecular Flow in Orion. *M. C. H. Wright, R. L. Plambeck, S. N. Vogel, P. T. P. Ho, and W. J. Welch.* **267**, L41, 45-E3 (1983)
- Positions of the SiO Masers in Orion-KL: Anisotropy on a Scale of 70 AU. *M. C. H. Wright and R. L. Plambeck.* **267**, L115, 51-D4 (1983)
- Detection of Interstellar NH<sub>3</sub> in the Far-Infrared: Warm and Dense Gas in Orion-KL. *C. H. Townes, R. Genzel, Dan M. Watson, and J. W. V. Storey.* **269**, L11, 69-A12 (1983)
- Magnetic Bubbles and High-Velocity Outflows in Molecular Clouds. *B. T. Draine.* **270**, 519, 82-G6 (1983)

- On the Contributions of the Orion Reflection Nebulosity to the Continuous UV Spectrum of the Herbig-Haro Objects HH 1 and HH 2 and of the C-S Star. *Reinhard Mundt and Adolf N. Witt*. **270**, L59, 87-C6 (1983)
- The Spatial Distribution of Shocked Gas in the Orion Nebula. *S. C. Beck and S. Beckwith*. **271**, 175, 89-G9 (1983)
- Detection of  $\text{CH}_3\text{OH } J = 5-4$  Lines around 242 GHz from OMC-1. *W. Boland, Th. de Graauw, S. Lindholm, and T. J. Lee*. **271**, 183, 90-A4 (1983)
- Studies of Extremely Young Clusters. VII. Spectroscopic Observations of Faint Stars in the Orion Nebula. *Merle F. Walker*. **271**, 642, 96-E2 (1983)
- First Detection of the Ground-State  $J_K = 1_0-0_0$  Submillimeter Transition of Interstellar Ammonia. *Jocelyn Keene, Geoffrey A. Blake, and T. G. Phillips*. **271**, L27, 93-B13 (1983)
- Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck*. **271**, L31, 93-C3 (1983)
- The Distribution of 6 Centimeter  $\text{H}_2\text{CO}$  in Orion Molecular Cloud 1. *K. J. Johnston, Patrick Palmer, T. L. Wilson, and J. H. Bieging*. **271**, L89, 100-D2 (1983)
- The Kinetic Temperature and  $\text{CH}_3\text{CCH}$  Column Density Profiles in Sgr B2, Orion, and DR 21. *E. Churchwell and J. M. Hollis*. **272**, 591, 108-C6 (1983)
- Vibrationally Excited  $\text{CH}_3\text{CN}$  and  $\text{HC}_3\text{N}$  in Orion. *Paul F. Goldsmith, Robert Krotkov, Ronald L. Snell, R. D. Brown, and Peter Godfrey*. **274**, 184, 125-G8 (1983)
- Nebulae: Planetary**
- A Photometric Survey of Compact and Selected Planetary Nebulae. *James B. Kaler*. **264**, 594, 8-F13 (1983)
- High-Resolution Near-Infrared and Millimeter-Wave Spectroscopy of NGC 7027. *Harley A. Thronson, Jr.* **264**, 599, 8-G5 (1983)
- On the Evolution of Those Nuclei of Planetary Nebulae That Experience a Final Helium Shell Flash. *Icko Iben, Jr., James B. Kaler, James W. Truran, and Alvio Rencini*. **264**, 605, 9-A1 (1983)
- A Newly Discovered Nearby Planetary Nebula of Old Age. *R. Weinberger, J. Dengel, H. Hartl, and F. Sabbadin*. **265**, 249, 14-G9 (1983)
- The Planetary Nebula IC 3568: A Model Based on IUE Observations. *J. Patrick Harrington and Walter A. Feibelman*. **265**, 258, 15-A4 (1983)
- The Hydrogen-depleted Planetary Nebulae Abell 30 and Abell 78. *George H. Jacoby and Holland C. Ford*. **266**, 298, 30-B13 (1983)
- Two-Dimensional Photometry of Planetary Nebulae. *Peter N. Kufperman*. **266**, 689, 35-F13 (1983)
- Nebular Dust and Extinction in Ionized Nebulae. I. The Balmer Decrement. *John S. Mathis*. **267**, 119, 41-C4 (1983)
- The Ionization Structure of Planetary Nebulae. III. NGC 7009. *Timothy Barker*. **267**, 630, 47-F4 (1983)
- Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart*. **267**, L89, 51-B7 (1983)
- The Effects of Mass and Metallicity upon Planetary Nebula Formation. *K. A. Papp, C. R. Purton, and S. Kwok*. **268**, 145, 53-E9 (1983)
- Distribution of Forbidden Neutral Carbon Emission in the Ring Nebula (NGC 6720). *D. C. Jewitt, P. N. Kufperman, G. E. Danielson, and S. P. Maran*. **268**, 683, 60-E13 (1983)
- The Binary Central Star of the Planetary Nebula LT-5. *Walter A. Feibelman and James B. Kaler*. **269**, 592, 72-G11 (1983)
- IUE Observations of the Perplexing Bipolar Planetary Nebula NGC 2346. *Walter A. Feibelman and Lawrence H. Aller*. **270**, 150, 78-E6 (1983)
- Sulfur Abundances in Three Halo Planetary Nebulae. *Timothy Barker*. **270**, 641, 85-B5 (1983)
- Determinations of S III, O IV, and Ne V Abundances in Planetary Nebulae from Infrared Lines. *M. A. Shure, T. Herter, J. R. Houck, D. A. Briotta, Jr., W. J. Forrest, G. E. Gull, and J. F. McCarthy*. **270**, 645, 85-B9 (1983)
- The Spectra of 12 New Subluminous O Stars. *J. S. Drilling*. **270**, L13, 81-A14 (1983)
- The Evolution of Large Planetary Nebulae and Their Central Stars. *James B. Kaler*. **271**, 188, 90-A9 (1983)
- The Precataclysmic Nucleus of Abell 41. *Albert D. Grauer and Howard E. Bond*. **271**, 259, 90-G5 (1983)
- Carbon Monoxide Emission from Planetary Nebulae and Their Possible Precursors. *Harley A. Thronson, Jr. and David Mozurkewich*. **271**, 611, 96-B12 (1983)
- The Evidence for Shell Formation in V1016 Cygni. *W. Deuel and H. Nussbaumer*. **271**, L19, 93-B4 (1983)
- Long-Period Variables in the Magellanic Clouds: Supergiants, AGB Stars, Supernova Precursors, Planetary Nebula Precursors, and Enrichment of the Interstellar Medium. *P. R. Wood, M. S. Bessell, and M. W. Fox*. **272**, 99, 102-B8 (1983)
- Near-Infrared Spectrophotometry of Planetary Nebulae. *P. D. LeVan and Richard J. Rudy*. **272**, 137, 102-E4 (1983)
- Late Stages of Stellar Evolution. II. Mass Loss and the Transition of Asymptotic Giant Branch Stars into Hot Remnants. *Detlef Schönberner*. **272**, 708, 109-E2 (1983)
- The Abundance of Carbon in Planetary Nebulae. *Howard B. French*. **273**, 214, 114-E5 (1983)
- Velocity Dispersion of Planetary Nebulae in the Nuclear Bulge of M31. *David G. Lawrie*. **273**, 562, 119-F8 (1983)
- A Spectroscopic Study of Some Planetary Nebulae in the Large Magellanic Cloud. *Lawrence H. Aller*. **273**, 590, 120-A8 (1983)
- O IV Temperature Determination for NGC 7662. *M. A. Shure, T. Herter, and J. R. Houck*. **274**, 646, 132-D11 (1983)
- VLA Continuum and OH Line Emission Observations of the Compact Nebula VY2-2. *E. R. Seaquist and L. E. Davis*. **274**, 659, 132-E14 (1983)
- Observations of NGC 7027 from 5.2 to 7.5 Microns: The Detection of Ni II and Additional Dust Features. *J. D. Bregman, H. L. Dinerstein, J. H. Goebel, D. F. Lester, F. C. Witteborn, and D. M. Rank*. **274**, 666, 132-F7 (1983)
- Planetary Nebulae and the Galactic Rotation Curve. *Stephen E. Schneider and Yervant Terzian*. **274**, L61, 136-B3 (1983)
- Mass Loss from Evolved Stars. II. Radio Continuum Emission and Evolution to Planetary Nebulae. *D. N. Spergel, J. L. Giuliani, Jr., and G. R. Knapp*. **275**, 330, 140-E10 (1983)
- Ultraviolet Observations of M1-2 (= VV 8). *Walter A. Feibelman*. **275**, 628, 144-D9 (1983)
- Chemical Compositions of Planetary Nebulae. *Lawrence H. Aller and Stanley J. Czyzak*. **51**, 211, 4-D1 (1983) (Abstr. in **264**, 747, 10-D11)
- Radial Velocities of Planetary Nebulae. *Stephen E. Schneider, Yervant Terzian, A. Purgathofer, and M. Perinotto*. **52**, 399, 15-G5 (1983) (Abstr. in **270**, 779, 86-E6)
- Nebulae: Reflection**
- Extended Near-Infrared Emission from Visual Reflection Nebulae. *K. Sellgren, M. W. Werner, and Harriet L. Dinerstein*. **271**, L13, 93-A13 (1983)
- Nebulae: Supernova Remnants**
- The X-Ray Surface Brightness of Kepler's Supernova Remnant. *Richard L. White and Knox S. Long*. **264**, 196, 3-A10 (1983)
- A Multiwavelength Comparison of Cassiopeia A and Tycho's Supernova Remnant: Erratum. *John R. Dickel, Stephen S. Murray, Jeffrey Morris, and Donald C. Wells*. **264**, 746, 10-D10 (1983) (Orig. paper in **257**, 145, 62-E6)
- What Is 4C 21.53? *W. C. Erickson*. **264**, L13, 5-A13 (1983)
- The Shape of Cooling Filaments in Old Supernova Remnants. *M. D. Smith and J. R. Dickel*. **265**, 272, 15-B4 (1983)
- The Supernova near the Nuclei of M31 and the Galaxy. *Sidney*

**Nebulae: Supernova Remnants—Continued**

- van den Bergh. **265**, 719, 20-E9 (1983)
- Evidence for the Stochastic Acceleration of Cosmic Rays in Supernova Remnants. *T. W. Hartquist and G. E. Morfill*. **266**, 271, 29-G10 (1983)
- The Mass of Tycho's Supernova Remnant as Determined from a High-Resolution X-Ray Map. *F. Seward, P. Gorenstein, and W. Tucker*. **266**, 287, 30-A14 (1983)
- High-Resolution Radio and X-Ray Observations of the Supernova Remnant W28. *M. D. Andrews, J. P. Basart, R. C. Lamb, and R. H. Becker*. **266**, 684, 35-F8 (1983)
- Shock Formation of  $\text{HCO}^+$ . *Moshe Elitzur*. **267**, 174, 41-G4 (1983)
- Equilibrium Composition and Neutrino Emissivity of Interacting Quark Matter in Neutron Stars. *Robert C. Duncan, Stuart L. Shapiro, and Ira Wasserman*. **267**, 358, 43-F12 (1983)
- MSH 15-52: A Supernova Remnant Containing Two Compact X-Ray Sources. *F. D. Seward, F. R. Harnden, Jr., P. Murdin, and David H. Clark*. **267**, 698, 48-D4 (1983)
- Optical Studies of Cassiopeia A. VI. Observations during the Period 1976-1980. *Sidney van den Bergh and Karl W. Kamper*. **268**, 129, 53-C9 (1983)
- High-Velocity, Asymmetric Doppler Shifts of the X-Ray Emission Lines of Cassiopeia A. *T. H. Markert, C. R. Canizares, G. W. Clark, and P. F. Winkler*. **268**, 134, 53-D12 (1983)
- The Central X-Ray Source in RCW 103: Evidence for Blackbody Emission. *I. R. Tuohy, G. P. Garmire, R. N. Manchester, and M. A. Dopita*. **268**, 778, 61-E14 (1983)
- Ring Ejection in Type II Supernovae: 1E 0102.2-7219 in the Small Magellanic Cloud. *Ian R. Tuohy and Michael A. Dopita*. **268**, L11, 57-A11 (1983)
- G29.7-0.3: Another Supernova Remnant with an Identity Crisis. *R. H. Becker, D. J. Helfand, and A. E. Szymkowiak*. **268**, L93, 63-F9 (1983)
- The Soft X-Ray Spectrum of the Vela Supernova Remnant. *Steven M. Kahn, Jean Brodie, Stuart Bowyer, and Philip A. Charles*. **269**, 212, 67-D12 (1983)
- Velocity Dispersions of Knots in Vela X and Puppis A. *Peter Shull, Jr.* **269**, 218, 67-E5 (1983)
- High-Velocity Iron Absorption Lines in Supernova Remnant 1006. *Chi-Chao Wu, Marvin Leventhal, Craig L. Sarazin, and Theodore R. Gull*. **269**, L5, 69-A7 (1983)
- VLA Observations of the Luminous Supernova Remnant in NGC 4449. *R. C. Bignell and E. R. Seaquist*. **270**, 140, 78-D10 (1983)
- Discovery of Large Radial Velocities in the Supernova Remnant 3C 58. *Robert A. Fesen*. **270**, L53, 87-B13 (1983)
- G296.05-0.50—A Large-Diameter Supernova Remnant. *J. L. Caswell and Peter J. Barnes*. **271**, L55, 100-A13 (1983)
- The Extraordinary Extragalactic Supernova Remnant in NGC 4449. II. X-Ray and Optical Investigations. *William P. Blair, Robert P. Kirshner, and P. Frank Winkler, Jr.* **272**, 84, 102-A3 (1983)
- A Large Molecular Cloud toward the SNR W50 and SS 433. *Y.-L. Huang, T. M. Dame, and P. Thaddeus*. **272**, 609, 108-D10 (1983)
- Digital Analysis of Narrow-Band Imagery of the Cygnus Loop. *J. Jeff Hester, Robert A. R. Parker, and Reginald J. Dufour*. **273**, 219, 114-E10 (1983)
- Semianalytical Treatment of the Hydrodynamics of Supernova Remnants during the Snowplow Phase. *Bernard Gaffet*. **273**, 267, 115-B11 (1983)
- The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams*. **274**, 168, 125-F6 (1983)

- The Infrared Echo of a Type II Supernova with a Circumstellar Dust Shell: Applications to SN 1979c and SN 1980k. *Eliahu Dwek*. **274**, 175, 125-F13 (1983)
- The Kinematics and Structure of N63A and Associated H II Regions. *Peter Shull, Jr.* **275**, 592, 144-A9 (1983)
- The Kinematics and Structure of N49. *Peter Shull, Jr.* **275**, 611, 144-C2 (1983)
- The Structure and Emission Spectrum of a Nonradiative Shock Wave in the Cygnus Loop. *J. C. Raymond, W. P. Blair, R. A. Fesen, and T. R. Gull*. **275**, 636, 144-E3 (1983)
- Shock Processing of Interstellar Grains. *C. Gregory Seab and J. Michael Shull*. **275**, 652, 144-F5 (1983)
- X-Ray Line Emission from Supernova Remnants. I. Models for Adiabatic Remnants. *Andrew J. S. Hamilton, Craig L. Sarazin, and Roger A. Chevalier*. **51**, 115, 2-E1 (1983) (Abstr. in **263**, 1005, 142-F6)
- Deep [O III] Interference Filter Imagery of the Supernova Remnants G65.3+5.7, G126.2+1.2, CTA 1, and VRO 42.05.01. *Robert A. Fesen and Theodore R. Gull*. **51**, 337, 7-D1 (1983) (Abstr. in **266**, 902, 38-B11)
- Supernova Remnants in the Magellanic Clouds. *D. S. Mathewson, V. L. Ford, M. A. Dopita, I. R. Tuohy, K. S. Long, and David J. Helfand*. **51**, 345, 7-F1 (1983) (Abstr. in **266**, 902, 38-B11)

**Neutrinos**

- Massive Neutrinos in Large-Scale Gravitational Clustering. *Adrian L. Melott*. **264**, 59, 1-E7 (1983)
- Is There Nonluminous Matter in Dwarf Spheroidal Galaxies? *S. M. Faber and D. N. C. Lin*. **266**, L17, 32-B3 (1983)
- Some Implications of Nonluminous Matter in Dwarf Spheroidal Galaxies. *D. N. C. Lin and S. M. Faber*. **266**, L21, 32-B7 (1983)
- Equilibrium Composition and Neutrino Emissivity of Interacting Quark Matter in Neutron Stars. *Robert C. Duncan, Stuart L. Shapiro, and Ira Wasserman*. **267**, 358, 43-F12 (1983)
- Stellar Collapses in the Galaxy. *John N. Bahcall and Tsvi Piran*. **267**, L77, 51-A11 (1983)
- Decay of Long-lived Particles in the Early Universe. *Joseph Silk and Albert Stebbins*. **269**, 1, 65-A6 (1983)
- Bulk Viscosity of Degenerate Neutrinos. *Ch. G. van Weert and L. J. van den Horn*. **270**, 315, 80-C12 (1983)
- Nonlinear Evolution of Large-Scale Structure in the Universe. *Carlos S. Frenk, Simon D. White, and Marc Davis*. **271**, 417, 94-A5 (1983)
- The Rate of the  ${}^3\text{He}(p, e^+ \nu){}^4\text{He}$  Reaction. *P. E. Tegnér and Chr. Bargholtz*. **272**, 311, 104-C13 (1983)
- Neutrino Emission from a Hot, Dense, Plane-parallel Atmosphere in Hydrostatic Equilibrium. III. The Three-flavored Atmosphere. *Paul J. Schinder and Stuart L. Shapiro*. **273**, 330, 115-G4 (1983)
- Constraints on Neutrino-dominated Cosmologies from Large-Scale Streaming Motion. *Nick Kaiser*. **273**, L17, 117-C4 (1983)
- The Bend in the Correlation Function: The Surviving Imprint of Adiabatic Perturbations? *Adrian L. Melott*. **273**, L21, 117-C8 (1983)
- Clustering in a Neutrino-dominated Universe. *Simon D. M. White, Carlos S. Frenk, and Marc Davis*. **274**, L1, 129-A2 (1983)
- Pancakes and the Formation of Galaxies in a Neutrino-dominated Universe. *Paul R. Shapiro, Curtis Struck-Marcell, and Adrian L. Melott*. **275**, 413, 142-A13 (1983)
- Neutrino-Pair Bremsstrahlung in Dense Stars. I. Liquid Metal Case. *Naoki Itoh and Yasuharu Kohyama*. **275**, 858, 147-A1 (1983)

**Notices**

- The Astrophysical Journal Instructions to Authors. *APJ Staff*. **270**, 1, 77-A6 (1983)
- Editorial. *Helmut A. Abt*. **273**, 1, 112-A6 (1983)



**Nuclear Reactions**

- Rates for Some Reactions in the Mass Range  $39 \leq A \leq 45$ . *M. A. Buckley and J. D. King*. **264**, 278, 3-G9 (1983)
- The Thermonuclear Model for X-Ray Transients: Erratum. *R. K. Wallace, S. E. Woosley, and Thomas A. Weaver*. **264**, 746, 10-D10 (1983) (Orig. paper in **258**, 696, 81-A1)
- Isotopic Neon Cross Sections for a Study of Neutron Balance and Temperature during *s*-Process Nucleosynthesis. *J. Almeida and F. Käppeler*. **265**, 417, 16-E13 (1983)
- Nucleosynthesis of  $^{26}\text{Al}$  at Low Stellar Temperatures. *A. E. Champagne, A. J. Howard, and P. D. Parker*. **269**, 686, 74-A1 (1983)
- Enhancement of Thermonuclear Reaction Rate Due to Screening by Relativistic Degenerate Electrons. *Shunsuo Ichimaru and Kenichi Utsumi*. **269**, L51, 76-B11 (1983)
- Neutron Capture Rates in the *r*-Process: The Role of Direct Radiative Capture. *G. J. Mathews, A. Mengoni, F.-K. Thielemann, and William A. Fowler*. **270**, 740, 86-B8 (1983)
- r*-Process Abundances near the Mass 130 Peak. *J. R. De Laeter and K. J. R. Rosman*. **270**, 746, 86-C1 (1983)
- Cross Section for the Reaction  $^{12}\text{C}(e,p)^{11}\text{B}$  and Its Relevance to the Formation of  $^{11}\text{B}$  in Active Galaxies. *Dieter H. Hoffmann, Achim Richter, Gerhard Schrieder, and Klaus Seegebarth*. **271**, 398, 92-C8 (1983)
- $^{26}\text{Mg}(p,n)^{26}\text{Al}$  Cross Section Measurements. *R. T. Skelton, R. W. Kavanagh, and D. G. Sargood*. **271**, 404, 92-C14 (1983)
- The Rate of the  $^3\text{He}(p, e^+ \nu)^4\text{He}$  Reaction. *P. E. Tegnér and Chr. Bargholtz*. **272**, 311, 104-C13 (1983)
- Implications of High-Energy Neutron Observations from Solar Flares. *R. Ramaty, R. J. Murphy, B. Kozlovsky, and R. E. Lingenfelter*. **273**, L41, 117-D12 (1983)
- $^{18}\text{O}(n, n')$  Inelastic Cross Section at 34 keV. *R. L. Macklin, R. R. Winters, N. W. Hill, and J. A. Harvey*. **274**, 408, 128-B11 (1983)
- Protons from the Decay of Solar Flare Neutrons. *Paul Evenson, Peter Meyer, and K. Roger Pyle*. **274**, 875, 135-A1 (1983)
- Carbon Star Formation and Neutron-rich Isotope Formation in Low-Mass Asymptotic Giant Branch Stars. *Icko Iben, Jr.* **275**, L65, 148-D5 (1983)
- Proton-Nucleus Total Inelastic Cross Sections: An Empirical Formula for  $E > 10$  MeV. *John R. Letaw, R. Silberberg, and C. H. Tsao*. **51**, 271, 6-A2 (1983) (Abstr. in **265**, 1136, 25-B12)

**Nucleosynthesis**

- Rates for Some Reactions in the Mass Range  $39 \leq A \leq 45$ . *M. A. Buckley and J. D. King*. **264**, 278, 3-G9 (1983)
- The *sp*-Process and Allende Isotope Anomalies in Calcium and Titanium. *M. J. Harris*. **264**, 613, 9-A9 (1983)
- Isotopic Neon Cross Sections for a Study of Neutron Balance and Temperature during *s*-Process Nucleosynthesis. *J. Almeida and F. Käppeler*. **265**, 417, 16-E13 (1983)
- Explosive Helium Burning in Supernovae: A Source of *r*-Process Elements. *J. J. Cowan, A. G. W. Cameron, and J. W. Truran*. **265**, 429, 16-F11 (1983)
- CNO Abundances and the Strengths of Nova Outbursts and Hydrogen Flashes on Accreting White Dwarfs. *Jim MacDonald*. **267**, 732, 48-F14 (1983)
- Barium from a Mini *r*-Process in Supernovae. *D. Heymann*. **267**, 747, 49-A1 (1983)
- The *R*- and *s*-Process Nuclei in the Early History of the Galaxy: HD 122563. *Christopher Sneden and M. Parthasarathy*. **267**, 757, 49-A11 (1983)
- Radioactive Models of Type I Supernovae. *Stuart R. Schurmann*. **267**, 779, 49-C10 (1983)
- Cosmic-Ray Abundances of Sn, Te, Xe, and Ba Nuclei Measured on HEAO 3. *W. R. Binns, R. K. Finkle, T. L. Garrard, M. H. Israel, J. Klarmann, K. E. Krombel, E. C. Stone, and C. J. Waddington*. **267**, L93, 51-B12 (1983)
- Extinct Radioactivities: A Three-Phase Mixing Model. *Donald*

*D. Clayton*. **268**, 381, 56-A12 (1983)

- A Two-dimensional Supernova Model with Rotation and Nuclear Burning. *Robert Bodenheimer and S. E. Woosley*. **269**, 281, 68-C3 (1983)
- A Survey of the Core Helium Flash with Dynamic Convection. *Robert G. Deupree and Peter W. Cole*. **269**, 676, 73-G5 (1983)
- Nucleosynthesis of  $^{26}\text{Al}$  at Low Stellar Temperatures. *A. E. Champagne, A. J. Howard, and P. D. Parker*. **269**, 686, 74-A1 (1983)
- Neutron Capture Rates in the *r*-Process: The Role of Direct Radiative Capture. *G. J. Mathews, A. Mengoni, F.-K. Thielemann, and William A. Fowler*. **270**, 740, 86-B8 (1983)
- r*-Process Abundances near the Mass 130 Peak. *J. R. De Laeter and K. J. R. Rosman*. **270**, 746, 86-C1 (1983)
- Nickel Overabundances in Extremely Metal-deficient Red Giants. *R. Earle Luck and Howard E. Bond*. **271**, L75, 100-C3 (1983)
- Discovery of *s*-Process Nd in Allende Residue. *Donald D. Clayton*. **271**, L107, 100-E3 (1983)
- The Al i-Cyanogen Correlation in the Spectra of Globular Cluster Red Giants and the Origin of Intercluster Heavy Element Variations. *John Norris and Graeme H. Smith*. **272**, 635, 108-F8 (1983)
- Spectrophotometry of 12 Metal-poor Galaxies: Implications for the Primordial Helium Abundance. *Daniel Kunth and Wallace L. W. Sargent*. **273**, 81, 113-A7 (1983)
- Heavy-Element Abundances in the Classical Barium Star HR 774. *Jocelyn Tomkin and David L. Lambert*. **273**, 722, 121-D14 (1983)
- Quantitative Technetium and Niobium Abundances in Heavy-Element Stars. *Verne V. Smith and George Wallerstein*. **273**, 742, 121-F6 (1983)
- On Tidal Detonation of Stars by Massive Black Holes. *G. V. Bicknell and R. A. Gingold*. **273**, 749, 121-F13 (1983)

**Numerical Methods**

- Numerical Simulations of the Decay of Satellite Galaxy Orbits. *D. N. C. Lin and Scott Tremaine*. **264**, 364, 6-C9 (1983)
- Analysis of Complete Quasar Samples to Obtain Parameters of Luminosity and Evolution Functions. *H. L. Marshall, Y. Avni, H. Tananbaum, and G. Zamorani*. **269**, 35, 65-D2 (1983)
- Numerical Experiments on the Clustering of Galaxies. *R. H. Miller*. **270**, 390, 82-D2 (1983)
- The Collapse and Violent Relaxation of *N*-Body Systems: Mass Segregation and the Secondary Maximum. *R. T. Farouki, G. L. Hoffman, and E. E. Salpeter*. **271**, 11, 88-B2 (1983)
- HYDRA: An Implicit Partial Differential Equation, Relaxation, Stability Analysis Package. *R. F. Stellingwerf*. **271**, 876, 99-A12 (1983)
- On Searches for Periodic Pulsed Emission: The Rayleigh Test Compared to Epoch Folding. *D. A. Leahy, R. F. Elsner, and M. C. Weisskopf*. **272**, 256, 103-F14 (1983)
- Analysis Methods for Results in Gamma-Ray Astronomy. *Ti-pei Li and Yu-qian Ma*. **272**, 317, 104-D6 (1983)
- Filamentary Galaxy Clustering: A Mapping Algorithm. *J. E. Moody, Edwin L. Turner, and J. Richard Gott III*. **273**, 16, 112-B7 (1983)
- Planar Numerical Cosmology. I. The Differential Equations. *Joan Centrella and James R. Wilson*. **273**, 428, 118-B9 (1983)
- Simulations of Sinking Satellites. *Simon D. M. White*. **274**, 53, 124-E2 (1983)
- Stellar Evolution in *N*-Body Simulations of Disk Galaxies. I. *Neil F. Comins*. **274**, 595, 132-A1 (1983)

**Opacities**

- The Dust around the Carbon Star IRC + 10216. *M. Jura*. **267**, 647, 47-G8 (1983)
- Interstellar Photoelectric Absorption Cross Sections, 0.03–10 keV. *Robert Morrison and Dan McCammon*. **270**, 119, 78-

**Opacities—Continued**

- C4 (1983)  
 The Thermal Pair Annihilation Spectrum: A Detailed Balance Approach. *Roland Svensson*. **270**, 300, 80-B11 (1983)  
 Effect of Molecules and Grains on Rosseland Mean Opacities. *David R. Alexander, Hollis R. Johnson, and Roger L. Rypm. 272*, 773, 110-B11 (1983)  
 The Effect of Heavy Element Opacity on the Structure of H II Regions. *Robert H. Rubin*. **274**, 671, 132-F12 (1983)  
 High-Velocity Absorbing Cloudlets as Potential Contributors to Observed Quasar Continua. *Ronald G. Eastman, Gordon M. MacAlpine, and Douglas O. Richstone*. **275**, 53, 137-E3 (1983)

**Particle Acceleration**

- Bubbles, Jets, and Clouds in Active Galactic Nuclei. *Michael D. Smith, Larry Smarr, Michael L. Norman, and James R. Wilson*. **264**, 432, 7-A11 (1983)  
 The Propagation of Energetic Ions in Magnetic Loops and Gamma-Ray Emission from Solar Flares. *Ellen G. Zweibel and Deborah A. Haber*. **264**, 648, 9-D2 (1983)  
 Solar Proton Flares with Weak Impulsive Phases. *E. W. Cliver, S. W. Kahler, and P. S. McIntosh*. **264**, 699, 10-A2 (1983)  
 Effects of Drift on the Transport of Cosmic Rays. VI. A Three-dimensional Model including Diffusion. *J. Kóta and J. R. Jokipii*. **265**, 573, 18-C4 (1983)  
 On the Origin of Relativistic Particles and Gamma-Rays in Quasars. *R. J. Protheroe and D. Kazanas*. **265**, 620, 19-D1 (1983)  
 The Reconfinement of Jets. *Robert H. Sanders*. **266**, 73, 27-F8 (1983)  
 Radiative or Two-Stream Instability as a Source for Pulsar Radio Emission. *E. Asséo, R. Pellat, and H. Sol*. **266**, 201, 29-B8 (1983)  
 Evidence for the Stochastic Acceleration of Cosmic Rays in Supernova Remnants. *T. W. Hartquist and G. E. Morfill*. **266**, 271, 29-G10 (1983)  
 Selective Acceleration of  $^3\text{He}$  in Solar Flare Particles by Radiation Pressure. *S. Hayakawa*. **266**, 370, 31-A2 (1983)  
 First-Order Fermi Acceleration in Solar Flares as a Mechanism for the Second-Step Acceleration of Prompt Protons and Relativistic Electrons. *T. Bai, H. S. Hudson, R. M. Pelling, R. P. Lin, R. A. Schwartz, and T. T. von Rosenvinge*. **267**, 433, 44-E3 (1983)  
 Solar Type II Radio Emission and the Shock Drift Acceleration of Electrons. *Gordon D. Holman and M. E. Pesses*. **267**, 837, 50-A1 (1983)  
 Isotopic Anomalies among Solar Energetic Particles: Contribution of Preacceleration in Collapsing Magnetic Neutral Sheets. *D. J. Mullan*. **268**, 385, 56-B2 (1983)  
 Pressure Collimation of Supersonic Radio Jets. *Arno Krautter, R. N. Henriksen, and Kayll Lake*. **269**, 81, 65-G6 (1983)  
 Effects of the Kelvin-Helmholtz Surface Instability on Supersonic Jets. *Philip E. Hardee*. **269**, 94, 66-A5 (1983)  
 2–165 keV Observations of Active Galaxies and the Diffuse Background. *R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson*. **269**, 423, 71-B2 (1983)  
 First Order and Second Order Fermi Acceleration of Energetic Charged Particles by Shock Waves. *G. M. Webb*. **270**, 319, 80-D2 (1983)  
 On the Drift Mechanism for Energetic Charged Particles at Shocks. *G. M. Webb, W. I. Axford, and T. Terasawa*. **270**, 537, 84-A10 (1983)  
 Gamma-Rays and the Production of Energetic Electrons in Enshrouding Material: A Model for the Quiescent Radio Emission from Cygnus X-3. *W. Thomas Vestrand*. **271**, 304, 91-C9 (1983)  
 Acceleration and Confinement of Energetic Particles in the 1980 June 7 Solar Flare. *S. R. Kane, K. Kai, T. Kosugi, S.*

*Enome, P. B. Landecker, and D. L. McKenzie*. **271**, 376, 92-A14 (1983)

- The High-Energy Spectrum of Hot Accretion Disks. *Jean A. Eilek and Minas Kafatos*. **271**, 804, 98-C5 (1983)  
 Alfvén Wave Collapse and the Stability of a Relativistic Electron Beam in a Magnetized Astrophysical Plasma. *Steven R. Spangler and James P. Sheerin*. **272**, 273, 104-A3 (1983)  
 Observations of High-Energy Jets in the Corona above the Quiet Sun, the Heating of the Corona, and the Acceleration of the Solar Wind. *G. E. Brueckner and J.-D. F. Bartoe*. **272**, 329, 104-E5 (1983)  
 Implications of HEAO 3 Data for the Acceleration and Propagation of Galactic Cosmic Rays. *J. F. Ormes and R. J. Protheroe*. **272**, 756, 110-A8 (1983)  
 Pair Production in Superstrong Magnetic Fields. *Joseph K. Daugherty and Alice K. Harding*. **273**, 761, 121-G11 (1983)  
 Implications of High-Energy Neutron Observations from Solar Flares. *R. Ramaty, R. J. Murphy, B. Kozlovsky, and R. E. Lingenfelter*. **273**, L41, 117-D12 (1983)  
 Electron Cyclotron Wave Acceleration Outside a Flaring Loop. *Phillip Sprangle and Loukas Vlahos*. **273**, L95, 123-D3 (1983)

**Photometry**

- Infrared Photometry of O Stars. *John I. Castor and Theodore Simon*. **265**, 304, 15-D9 (1983)  
 Faint Star Studies in the Magellanic Clouds. I. RICHFLD Photographic Photometry in NGC 2257. *L. L. Stryker*. **266**, 82, 27-G3 (1983)  
 Discovery of Eclipses in the X-Ray Source HD 155638. *Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry*. **270**, L79, 87-D8 (1983)  
 The Evolutionary State and Pulsation Characteristics of Red Variables in Globular Clusters. *Jay A. Frogel*. **272**, 167, 102-G6 (1983)  
 Faint Stellar Photometry in Clusters. I. NGC 2204 and E3. *Jay A. Frogel and Bruce A. Twarog*. **274**, 270, 126-F11 (1983)  
 Observations of Active Chromosphere Stars. *Bernard W. Bopp, John L. Africano, R. E. Stencel, P. V. Noah, and A. Klimke*. **275**, 691, 145-B2 (1983)  
 UVB Photometry for Southern OB Stars. *R. E. Schild, R. F. Garrison, and W. A. Hiltner*. **51**, 321, 7-A2 (1983) (Abstr. in **266**, 903, 38-B12)  
 Massive Eclipsing Binary Candidates. *R. F. Garrison, R. E. Schild, and W. A. Hiltner*. **52**, 1, 9-A2 (1983) (Abstr. in **267**, 892, 50-D14)  
 New UVBRI Photometry for 900 Supergiants. *J. D. Fernie*. **52**, 7, 9-A8 (1983) (Abstr. in **267**, 893, 50-E1)  
 A Catalog of Spectral Classification and Photometry of Barium Stars. *P. K. Lü, D. W. Dawson, A. R. Upgren, and E. W. Weis*. **52**, 169, 11-E11 (1983) (Abstr. in **268**, 905, 63-A8)  
 A uvby,  $\beta$  Photometric Survey of Southern Hemisphere Eclipsing Binary Stars. *George W. Wolf and Janet T. Kern*. **52**, 429, 16-B7 (1983) (Abstr. in **270**, 780, 86-E7)  
 Predicted Infrared Brightness of Stars within 25 Parsecs of the Sun. *Hugh M. Johnson and Christine D. Wright*. **53**, 643, 25-D8 (1983) (Abstr. in **273**, 840, 122-F10)  
 Infrared Photometry, Bolometric Luminosities, and Effective Temperatures for Giant Stars in 26 Globular Clusters. *Jay A. Frogel, S. E. Persson, and Judith G. Cohen*. **53**, 713, 26-B9 (1983) (Abstr. in **273**, 841, 122-F11)

**Planets: Abundances**

- Measurements of Stratospheric Ethane in the Jovian South Polar Regions from Infrared Heterodyne Spectroscopy of the  $\nu_3$  Band near 12 Microns. *T. Kostiuik, M. J. Mumma, F. Espenak, D. Deming, D. E. Jennings, W. Maguire, and D. Zipoy*. **265**, 564, 18-B9 (1983)  
 An Analysis of the Reflection Spectrum of Jupiter from 1500 Å to 1740 Å. *G. Randall Gladstone and Yuk L. Yung*. **266**, 415, 31-D6 (1983)  
 On the Global Distribution of Pluto's Atmosphere. *L. Trafton*

- and S. A. Stern. **267**, 872, 50-C8 (1983)
- The  $\text{NH}_3$  Spectrum in Saturn's 5 Micron Window. *Uwe Fink, Harold P. Larson, Gordon L. Bjoraker, and James R. Johnson*. **268**, 880, 62-F5 (1983)
- Methane on Triton and Pluto: New CCD Spectra. *Jerome Apt, Nathaniel P. Carleton, and Craig D. Mackay*. **270**, 342, 80-E11 (1983)
- Desaturation of  $\text{H}_2$  Quadrupole Lines in the Atmospheres of the Outer Planets. *William D. Cochran and Wm. Hayden Smith*. **271**, 859, 98-G6 (1983)
- Monodeuterated Methane in the Outer Solar System. I. Spectroscopic Analysis of the Bands at 1.55 and 1.95 Microns. *Barry L. Lutz, C. de Bergh, and J. P. Maillard*. **273**, 397, 116-E7 (1983)
- A Measurement of the  $^{12}\text{CO}/^{13}\text{CO}$  Ratio in the Mesosphere of Venus. *R. Todd Clancy and Duane O. Muhleman*. **273**, 829, 122-E11 (1983)
- Planets: Atmospheres**
- Temporal Variations of the Jovian  $\text{H}\alpha$  Lyman-Alpha Emission (1979-1982). *T. E. Skinner, S. T. Durrance, P. D. Feldman, and H. W. Moos*. **265**, L23, 18-F6 (1983)
- An Analysis of the Reflection Spectrum of Jupiter from 1500 Å to 1740 Å. *G. Randall Gladstone and Yuk L. Yung*. **266**, 415, 31-D6 (1983)
- On the Global Distribution of Pluto's Atmosphere. *L. Trafton and S. A. Stern*. **267**, 872, 50-C8 (1983)
- Desaturation of  $\text{H}_2$  Quadrupole Lines in the Atmospheres of the Outer Planets. *William D. Cochran and Wm. Hayden Smith*. **271**, 859, 98-G6 (1983)
- A Measurement of the  $^{12}\text{CO}/^{13}\text{CO}$  Ratio in the Mesosphere of Venus. *R. Todd Clancy and Duane O. Muhleman*. **273**, 829, 122-E11 (1983)
- Planets: Charged Particles**
- Detection of Auroral Hydrogen Lyman-Alpha Emission from Uranus: Erratum. *John T. Clarke*. **269**, L25, 69-B9 (1983) (Orig. paper in **263**, L105, 143-E8)
- Planets: General**
- Quadrupole Moment of the Sun and the Planetary Orbits. *L. Campbell and J. W. Moffat*. **275**, L77, 148-E1 (1983)
- Planets: Interiors**
- Statistical Mechanics of Light Elements at High Pressure. V. Three-dimensional Thomas-Fermi-Dirac Theory. *J. J. MacFarlane and W. B. Hubbard*. **272**, 301, 104-C3 (1983)
- Planets: Jupiter**
- Io's Sodium Cloud: Explanation of the East-West Asymmetries. II. *William H. Smyth*. **264**, 708, 10-A14 (1983)
- Measurements of Stratospheric Ethane in the Jovian South Polar Regions from Infrared Heterodyne Spectroscopy of the  $\nu_2$  Band near 12 Microns. *T. Kostjuk, M. J. Mumma, F. Espenak, D. Deming, D. E. Jennings, W. Maguire, and D. Zipoy*. **265**, 564, 18-B9 (1983)
- Temporal Variations of the Jovian  $\text{H}\alpha$  Lyman-Alpha Emission (1979-1982). *T. E. Skinner, S. T. Durrance, P. D. Feldman, and H. W. Moos*. **265**, L23, 18-F6 (1983)
- An Analysis of the Reflection Spectrum of Jupiter from 1500 Å to 1740 Å. *G. Randall Gladstone and Yuk L. Yung*. **266**, 415, 31-D6 (1983)
- Rocket Detection of Ultraviolet Emission from Neutral Oxygen and Sulfur in the Io Torus. *S. T. Durrance, P. D. Feldman, and H. A. Weaver*. **267**, L125, 51-D14 (1983)
- Observed Departure of the Io Plasma Torus from Rigid Corotation with Jupiter. *Robert A. Brown*. **268**, L47, 57-D9 (1983)
- IUE Spectrum of the Io Torus: Identification of the  $^3\text{S}_2 \rightarrow ^3\text{P}_{2,1}$  Transitions of S III. *H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou*. **275**, L19, 141-G4 (1983)
- Planets: Magnetospheres**
- The Magnetosphere of Uranus: Plasma Sources, Convection, and Field Configuration. *G.-H. Voigt, T. W. Hill, and A. J. Dessler*. **266**, 390, 31-B8 (1983)
- Escape and Ionization of Atomic Oxygen from Io. *William H. Smyth and Donald E. Shemansky*. **271**, 865, 99-A1 (1983)
- Planets: Pluto**
- On the Global Distribution of Pluto's Atmosphere. *L. Trafton and S. A. Stern*. **267**, 872, 50-C8 (1983)
- Methane on Triton and Pluto: New CCD Spectra. *Jerome Apt, Nathaniel P. Carleton, and Craig D. Mackay*. **270**, 342, 80-E11 (1983)
- Planets: Satellites**
- A Deficiency of O III in the Io Plasma Torus. *Robert A. Brown, Donald E. Shemansky, and Robert E. Johnson*. **264**, 309, 4-B14 (1983)
- Io's Sodium Cloud: Explanation of the East-West Asymmetries. II. *William H. Smyth*. **264**, 708, 10-A14 (1983)
- Rocket Detection of Ultraviolet Emission from Neutral Oxygen and Sulfur in the Io Torus. *S. T. Durrance, P. D. Feldman, and H. A. Weaver*. **267**, L125, 51-D14 (1983)
- Observed Departure of the Io Plasma Torus from Rigid Corotation with Jupiter. *Robert A. Brown*. **268**, L47, 57-D9 (1983)
- Methane on Triton and Pluto: New CCD Spectra. *Jerome Apt, Nathaniel P. Carleton, and Craig D. Mackay*. **270**, 342, 80-E11 (1983)
- Escape and Ionization of Atomic Oxygen from Io. *William H. Smyth and Donald E. Shemansky*. **271**, 865, 99-A1 (1983)
- Coulomb Thermal Properties and Stability of the Io Plasma Torus. *D. D. Barbosa, F. V. Coroniti, and A. Eviatar*. **274**, 429, 128-D4 (1983)
- IUE Spectrum of the Io Torus: Identification of the  $^3\text{S}_2 \rightarrow ^3\text{P}_{2,1}$  Transitions of S III. *H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou*. **275**, L19, 141-G4 (1983)
- Planets: Saturn**
- The  $\text{NH}_3$  Spectrum in Saturn's 5 Micron Window. *Uwe Fink, Harold P. Larson, Gordon L. Bjoraker, and James R. Johnson*. **268**, 880, 62-F5 (1983)
- Planets: Spectra**
- An Analysis of the Reflection Spectrum of Jupiter from 1500 Å to 1740 Å. *G. Randall Gladstone and Yuk L. Yung*. **266**, 415, 31-D6 (1983)
- The  $\text{NH}_3$  Spectrum in Saturn's 5 Micron Window. *Uwe Fink, Harold P. Larson, Gordon L. Bjoraker, and James R. Johnson*. **268**, 880, 62-F5 (1983)
- Observed Departure of the Io Plasma Torus from Rigid Corotation with Jupiter. *Robert A. Brown*. **268**, L47, 57-D9 (1983)
- Methane on Triton and Pluto: New CCD Spectra. *Jerome Apt, Nathaniel P. Carleton, and Craig D. Mackay*. **270**, 342, 80-E11 (1983)
- Desaturation of  $\text{H}_2$  Quadrupole Lines in the Atmospheres of the Outer Planets. *William D. Cochran and Wm. Hayden Smith*. **271**, 859, 98-G6 (1983)
- $^{12}\text{CH}_3\text{D}$  Rovibrational Intensities and the Jovian D/H Ratio. *C. Chackerian, Jr.* **273**, L47, 117-E3 (1983)
- Planets: Uranus**
- The Magnetosphere of Uranus: Plasma Sources, Convection, and Field Configuration. *G.-H. Voigt, T. W. Hill, and A. J. Dessler*. **266**, 390, 31-B8 (1983)
- The Albedo of Uranus. *G. W. Lockwood, B. L. Lutz, D. T. Thompson, and A. Warnock III*. **266**, 402, 31-C6 (1983)
- Detection of Auroral Hydrogen Lyman-Alpha Emission from Uranus: Erratum. *John T. Clarke*. **269**, L25, 69-B9 (1983) (Orig. paper in **263**, L105, 143-E8)
- Planets: Venus**
- A Measurement of the  $^{12}\text{CO}/^{13}\text{CO}$  Ratio in the Mesosphere of Venus. *R. Todd Clancy and Duane O. Muhleman*. **273**, 829, 122-E11 (1983)
- Plasmas**
- A Deficiency of O III in the Io Plasma Torus. *Robert A. Brown, Donald E. Shemansky, and Robert E. Johnson*. **264**, 309, 4-B14 (1983)
- Large-Amplitude Hydromagnetic Waves in Collisionless Re-

## Plasmas—Continued

- lativistic Plasma: Exact Solution for the Fast-Mode Magnetoacoustic Wave. *Aaron Barnes*. **265**, 457, 17-A11 (1983)
- Spectral and Temporal Effects of a Plasma Shell around an X-Ray Source. *Kar Man Chang and Nikolaos D. Kylafis*. **265**, 1005, 23-F11 (1983)
- Inner-Shell Transitions in Fe XIX–XXII in the X-Ray Spectra of Solar Flares and Tokamaks. *K. J. H. Phillips, J. R. Le-men, R. D. Cowan, G. A. Doschek, and J. W. Leibacher*. **265**, 1120, 25-A10 (1983)
- Amorphous Glassy Plasma in Dense Stellar Matter. *Setsuo Ichimaru, Hiroshi Iyetomi, Shinichi Mitake, and Naoki Itoh*. **265**, L83, 26-D11 (1983)
- Pair Creation above Pulsar Polar Caps: Geometrical Structure and Energetics of Slot Gaps. *Jonathan Arons*. **266**, 215, 29-C8 (1983)
- Invalidity of Local Thermodynamic Equilibrium for Electrons in the Solar Transition Region. I. Fokker-Planck Results. *Edward C. Shoub*. **266**, 339, 30-E12 (1983)
- Why Are Broad Emission Lines Seen in Seyfert Galaxies and Not in BL Lacertae Objects? *P. W. Guilbert, A. C. Fabian, and Richard McCray*. **266**, 466, 33-D6 (1983)
- A Wind and Shock Model for Active Galactic Nuclei. *M. Camenzind and Thierry J.-L. Courvoisier*. **266**, L83, 39-A13 (1983)
- Nonlinear Propagation of Hydromagnetic Waves in High-Beta Plasmas. *P. K. Shukla*. **268**, 396, 56-B13 (1983)
- Relativistic Thermal Plasmas: Effects of Magnetic Fields. *Suguru Araki and Alan P. Lightman*. **269**, 49, 65-E2 (1983)
- Absorption of Radiation Propagating Obliquely in a Magnetoplasma. *A. Khandker, R. F. O'Connell, and G. W. Ford*. **269**, 668, 73-F11 (1983)
- Turbulent Resistive Heating of Solar Coronal Arches. *Gregory Benford*. **269**, 690, 74-A5 (1983)
- Enhancement of Thermonuclear Reaction Rate Due to Screening by Relativistic Degenerate Electrons. *Setsuo Ichimaru and Kenichi Utsumi*. **269**, L51, 76-B11 (1983)
- Solar Radio Emission Very near the Plasma Frequency. *Donat G. Wentzel*. **270**, 250, 79-F1 (1983)
- The Thermal Pair Annihilation Spectrum: A Detailed Balance Approach. *Roland Svensson*. **270**, 300, 80-B11 (1983)
- Electrodynamic Coupling in Magnetically Confined X-Ray Plasmas of Astrophysical Origin. *James A. Ionson*. **271**, 778, 98-A6 (1983)
- A Search for the Sunyaev-Zel'dovich Effect at Millimeter Wavelengths. *S. S. Meyer, A. D. Jeffries, and R. Weiss*. **271**, L1, 93-A2 (1983)
- Interpretation of Solar Type III Radio Emission. *Mitsuhiko Nambu and P. K. Shukla*. **271**, L35, 93-C7 (1983)
- Focusing of High-Mach Number Jets by an Ambient Medium. *David Eichler*. **272**, 48, 101-E7 (1983)
- Alfvén Wave Collapse and the Stability of a Relativistic Electron Beam in a Magnetized Astrophysical Plasma. *Steven R. Spangler and James P. Sheerin*. **272**, 273, 104-A3 (1983)
- The Effect of MHD Instabilities on the Flaring of Cometary Plasma Tails. *Malcolm B. Niedner, Jr., Alexander I. Ershkovich, and John C. Brandt*. **272**, 362, 105-A3 (1983)
- On the Propagation of Acoustic Waves in a Radiating Fluid. *Dimitri Mihalas and Barbara Weibel Mihalas*. **273**, 355, 116-B6 (1983)
- Theoretical Non-Maxwellian Particle Velocity Distribution Functions for Spherically Symmetric Solar Wind-like Plasma Systems and Consequences. *Sami Cuperman, Itzhak Weiss, and Murray Dryer*. **273**, 363, 116-B14 (1983)
- Magnetic Reconnection Driven by Velocity Space Instabilities. *Bruno Coppi*. **273**, L101, 123-D8 (1983)
- Deceleration of Grand Unified Theory Monopoles in a Plasma. *Andrew J. S. Hamilton and Craig L. Sarazin*. **274**, 399, 128-B2 (1983)
- Coulomb Thermal Properties and Stability of the Io Plasma Torus. *D. D. Barbosa, F. V. Coroniti, and A. Eviatar*. **274**, 429, 128-D4 (1983)
- Thermochemical Instabilities in Reacting Gases. I. Plasma of Hydrogen. *Miguel H. Ibañez and Antonio Parravano*. **275**, 181, 139-A11 (1983)
- Stochastic Three-Wave Interaction in Flaring Solar Loops. *Loukas Vlahos, R. R. Sharma, and K. Papadopoulos*. **275**, 374, 141-A12 (1983)
- The Magnetic Flux Problem and Ambipolar Diffusion during Star Formation: One-dimensional Collapse. I. Formulation of the Problem and Method of Solution. *Efthimios V. Paleologou and Telemachos Ch. Mouschovias*. **275**, 838, 146-F5 (1983)
- Line Radiation from a Hot, Optically Thin Plasma: Collision Strengths and Emissivities. *T. J. Gaetz and E. E. Salpeter*. **52**, 155, 11-D9 (1983) (Abstr. in **268**, 906, 63-A9)

## Polarization

- X Persei: Optical Polarization Variation on the 580 Day Binary-like Period. *James C. Kemp and Mark S. Barbour*. **264**, 237, 3-D9 (1983)
- The Wavelength Dependence of Interstellar Polarization in the Large Magellanic Cloud. *Geoffrey C. Clayton, P. G. Martin, and Ian Thompson*. **265**, 194, 14-C3 (1983)
- Intensity Dependence of the Pulse Profile and Polarization of the Vela Pulsar. *S. Krishnamohan and G. S. Downs*. **265**, 372, 16-B10 (1983)
- 6 Centimeter Observations of Solar Bursts with 0.1 s Time Constant and Arcsec Resolution. *Arie Kattenberg and Marc Allaart*. **265**, 535, 17-G8 (1983)
- Simultaneous Visual-Infrared Polarimetry of QSOs. *J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti*. **265**, 625, 19-D6 (1983)
- Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. *J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado*. **265**, 1066, 24-D5 (1983)
- The Polarization of the Infrared Cluster in Orion: The Spatial Distribution of the 3.8 Micron Polarization. *Michael W. Werner, Harriet L. Dinerstein, and R. W. Capps*. **265**, L13, 18-E10 (1983)
- The Polarization of Seyfert Galaxies. *P. G. Martin, I. B. Thompson, J. Maza, and J. R. P. Angel*. **266**, 470, 33-D10 (1983)
- Opacity Effects at Radio Wavelengths in the Quasar 1308 + 326. *C. P. O'Dea, W. A. Dent, and T. J. Balonek*. **266**, L1, 32-A2 (1983)
- The Broad-Band Circular Polarization of Sunspots, 0.37–4.5 Microns. *James C. Kemp and Gary D. Henson*. **266**, L69, 32-E7 (1983)
- Nebular Dust and Extinction in Ionized Nebulae. I. The Balmer Decrement. *John S. Mathis*. **267**, 119, 41-C4 (1983)
- The Polarization of Millimeter-Wave Emission Lines in Dense Interstellar Clouds. *P. G. Wannier, N. Z. Scoville, and R. Barvainis*. **267**, 126, 41-C11 (1983)
- Polarization of Interstellar Radio-Frequency Lines and Magnetic Field Direction. *Nikolaos D. Kylafis*. **267**, 137, 41-D8 (1983)
- Transfer of Polarized Radiation in Astronomical Masers. *L. R. Western and W. D. Watson*. **268**, 849, 62-D3 (1983)
- Microwave and Hard X-Ray Imaging of a Solar Flare on 1980 November 5. *P. Hoyng, K. A. Marsh, H. Zirin, and B. R. Dennis*. **268**, 865, 62-E5 (1983)
- Absorption of Radiation Propagating Obliquely in a Magnetoplasma. *A. Khandker, R. F. O'Connell, and G. W. Ford*. **269**, 668, 73-F11 (1983)
- The Impulsive Phase of Solar Flares. II. Characteristics of the Hard X-Rays. *John Leach and Vahé Petrosian*. **269**, 715, 74-C12 (1983)



- Optical Polarimetry of Broad-Line Radio Galaxies. *Richard J. Rudy, G. D. Schmidt, H. S. Stockman, and Richard L. Moore*. **271**, 59, 88-E8 (1983)
- Identification of CW 1103+254 as a New Magnetic Variable. *H. S. Stockman, C. B. Foltz, G. D. Schmidt, and S. Tapia*. **271**, 725, 97-D5 (1983)
- Evidence for a Highly Polarized Continuum in the Nucleus of NGC 1068. *Joseph S. Miller and Robert R. J. Antonucci*. **271**, L7, 93-A8 (1983)
- Interstellar Polarization, Grain Growth, and Alignment. *Per A. Aannestad and J. Mayo Greenberg*. **272**, 551, 107-G6 (1983)
- Polarization of Interstellar Molecular Radiofrequency Absorption Lines. *Nikolaos D. Kylafis and Paul R. Shapiro*. **272**, L35, 105-F12 (1983)
- The Radio Structure of 3C 279. *Imke de Pater and Richard A. Perley*. **273**, 64, 112-G2 (1983)
- Linear and Circular Polarization of the Cosmic Background Radiation. *P. Lubin, P. Melese, and G. Smoot*. **273**, L51, 123-A4 (1983)
- Discovery of Eclipse Polarization in Algol. *James C. Kemp, Gary D. Henson, Mark S. Barbour, Daniel J. Kraus, and George W. Collins II*. **273**, L85, 123-C7 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverly J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Geometrical Effects on the Emission Properties of Astronomical Masers: Linear Polarization and Apparent Size. *L. R. Western and W. D. Watson*. **274**, 195, 126-A5 (1983)
- Observed Time Delays between Solar H $\alpha$  Flares and Microwave Bursts as Evidence for Various Energy Transport Mechanisms. *N. Kämpfer and A. Magun*. **274**, 910, 135-D5 (1983)
- Dramatic Variations in the Polarization of BL Lacertae: Shocks and Gas? *Hugh D. Aller, Phillip E. Hodge, and Margo F. Aller*. **274**, L19, 129-B3 (1983)
- Linear Polarization of Interstellar Radio-Frequency Absorption Lines and Magnetic Field Direction. *Nikolaos D. Kylafis*. **275**, 135, 138-E4 (1983)
- Linear Polarization of Astronomical Masers by Anisotropic Pumping and Its Enhancement Due to Geometry. *L. R. Western and W. D. Watson*. **275**, 195, 139-B11 (1983)
- Linear Polarization Measurements of the AM Herculis Objects H0139-68 and E1405-451. *N. Visvanathan and I. Tuohy*. **275**, 709, 145-C6 (1983)
- Microwave Signatures from a Reconnecting Plasma Pinch, with Application to Loop Flares. *Yung Mok*. **275**, 901, 147-D2 (1983)
- A Catalog of High Accuracy Circular Polarization Measurements. *Kurt W. Weiler and Imke de Pater*. **52**, 293, 13-D12 (1983) (Abstr. in **269**, 808, 75-C7)
- Linear Polarization Observations in Selected Celestial Zones: The Gum Nebula Area. *R. C. Bignell and J. P. Vallée*. **53**, 147, 18-D9 (1983) (Abstr. in **271**, 893, 99-C1)
- Proper Motions:** see **Stars: Stellar Dynamics**
- Pulsars**
- Absence of Pulsar Ghost Remnants. *N. L. Cohen, W. D. Cotton, B. J. Geldzahler, and J. M. Marcaide*. **264**, 273, 3-G4 (1983)
- Observations of Centaurus X-3 by Hakucho. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Mat-suoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibasaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo*. **264**, 563, 8-D8 (1983)
- Intensity Dependence of the Pulse Profile and Polarization of the Vela Pulsar. *S. Krishnamohan and G. S. Downs*. **265**, 372, 16-B10 (1983)
- Masses, Radii, and Magnetic Fields of Pulsating X-Ray Sources: Is the "Standard" Model Self-consistent? *Ira Wasserman and Stuart L. Shapiro*. **265**, 1036, 24-B2 (1983)
- An Upper Limit on the Stochastic Background of Ultralow-Frequency Gravitational Waves. *R. W. Romani and J. H. Taylor*. **265**, L35, 26-A4 (1983)
- Upper Limits on the Isotropic Gravitational Radiation Background from Pulsar Timing Analysis. *R. W. Hellings and G. S. Downs*. **265**, L39, 26-A7 (1983)
- On Searches for Pulsed Emission with Application to Four Globular Cluster X-Ray Sources: NGC 1851, 6441, 6624, and 6712. *D. A. Leahy, W. Darbro, R. F. Elsner, M. C. Weisskopf, P. G. Sutherland, S. Kahn, and J. E. Grindlay*. **266**, 160, 28-F9 (1983)
- Accretion onto Magnetized Neutron Stars: X-Ray Pulsars with Intermediate Rotation Rates. *David J. Burnard, Susan M. Lea, and Jonathan Arons*. **266**, 175, 28-G10 (1983)
- Radio Pulsar Disk Electrodynamics. *F. Curtis Michel*. **266**, 188, 29-A9 (1983)
- Radiative or Two-Stream Instability as a Source for Pulsar Radio Emission. *E. Asséo, R. Pellat, and H. Sol*. **266**, 201, 29-B8 (1983)
- Pair Creation above Pulsar Polar Caps: Geometrical Structure and Energetics of Slot Gaps. *Jonathan Arons*. **266**, 215, 29-C8 (1983)
- High-Energy X-Ray Observations of Vela X-1. *M. Bautz, S. Howe, A. Gorecki, F. Lang, A. Levine, F. Primini, and W. H. G. Lewin*. **266**, 794, 37-A8 (1983)
- The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae). *G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen*. **266**, 806, 37-B10 (1983)
- A Two-Component X-Ray Spectrum from SMC X-1. *F. E. Marshall, N. E. White, and R. H. Becker*. **266**, 814, 37-C4 (1983)
- The Effect of Sudden Mass Loss and a Random Kick Velocity Produced in a Supernova Explosion on the Dynamics of a Binary Star of Arbitrary Orbital Eccentricity. Applications to X-Ray Binaries and to the Binary Pulsars. *J. G. Hills*. **267**, 322, 43-D4 (1983)
- MSH 15-52: A Supernova Remnant Containing Two Compact X-Ray Sources. *F. D. Seward, F. R. Harnden, Jr., P. Murdin, and David H. Clark*. **267**, 698, 48-D4 (1983)
- The Period History of the X-Ray Pulsar in MSH 15-52. *M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Naranan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward*. **267**, 711, 48-E5 (1983)
- An Attempt to Resolve Pulsar Magnetospheres Using Interstellar Scintillations. *J. M. Cordes, J. M. Weisberg, and V. Boriakoff*. **268**, 370, 56-A1 (1983)
- Further Observations of the Long-Period Binary Pulsar PSR 0820+02. *R. N. Manchester, Lynette M. Newton, D. J. Cooke, P. R. Backus, M. Damashek, J. H. Taylor, and J. J. Condon*. **268**, 832, 62-B14 (1983)
- G29.7-0.3: Another Supernova Remnant with an Identity Crisis. *R. H. Becker, D. J. Helfand, and A. E. Szymkowiak*. **268**, L93, 63-F9 (1983)
- The X-Ray Absorption Spectrum of 4U 1700-37 and Its Implications for the Stellar Wind of the Companion HD 153919. *N. E. White, T. R. Kallman, and J. H. Swank*. **269**, 264, 68-A13 (1983)
- The Pulse Profile of the Crab Pulsar in the Energy Range 45 keV-1.2 MeV. *R. B. Wilson and G. J. Fishman*. **269**, 273, 68-B8 (1983)

**Pulsars—Continued**

- Observations of Two Gamma-Ray Bursts by Vela X-Ray Detectors: Erratum. *J. Terrell, E. E. Fenimore, R. W. Klebesadel, and U. D. Desai.* **269**, 806, 75-C5 (1983) (Orig. paper in **254**, 279, 29-A12)
- Accretion Powered X-Ray Pulsars. *N. E. White, J. H. Swank, and S. S. Holt.* **270**, 711, 85-G7 (1983)
- X-Rays from Radio Pulsars: The Detection of PSR 1055–52. *Andrew F. Cheng and David J. Helfand.* **271**, 271, 91-A4 (1983)
- Pulselike Character of Blackbody Radiation from Neutron Stars. *George Greenstein and Gregory J. Hartke.* **271**, 283, 91-B2 (1983)
- On Searches for Periodic Pulsed Emission: The Rayleigh Test Compared to Epoch Folding. *D. A. Leahy, R. F. Elsner, and M. C. Weisskopf.* **272**, 256, 103-F14 (1983)
- HEAO 1 High-Energy X-Ray Observations of Centaurus X-3. *S. K. Howe, F. A. Primini, M. W. Bautz, F. L. Lang, A. M. Levine, and W. H. G. Lewin.* **272**, 678, 109-B12 (1983)
- On the Radio Pulse Emission Mechanism of PSR 1133+16: Simultaneous Dual-Frequency High Time Resolution Observations. *Valentin Boriakoff.* **272**, 687, 109-C7 (1983)
- Implications of the Millisecond Pulsar for Neutron Star Models. *Stuart L. Shapiro, Saul A. Teukolsky, and Ira Wasserman.* **272**, 702, 109-D10 (1983)
- Infrared Study of the Crab Pulsar: The "Shoulder" Pulse and the 3.45 Micron Pulse Profile. *J. Middleditch, C. Pennypacker, and M. S. Burns.* **273**, 261, 115-B5 (1983)
- Search for Pulsed Gamma-Ray Emission at MeV Energies from 24 Radio Pulsars. *U. Graser and V. Schönfelder.* **273**, 681, 121-A13 (1983)
- Distance to the 1.5 Millisecond Pulsar and Other 4C 21.53 Objects. *Carl Heiles, Shrinivas R. Kulkarni, Mary A. Stevens, D. C. Backer, M. M. Davis, and W. M. Goss.* **273**, L75, 123-B11 (1983)
- Infrared and Optical Pulsations from HZ Herculis and Possible 3.5 Second Infrared Pulsations from 1E 2259+586. *J. Middleditch, C. R. Pennypacker, and M. S. Burns.* **274**, 313, 127-B14 (1983)
- Toward an Empirical Theory of Pulsar Emission. I. Morphological Taxonomy. *Joanna M. Rankin.* **274**, 333, 127-D6 (1983)
- Toward an Empirical Theory of Pulsar Emission. II. On the Spectral Behavior of Component Width. *Joanna M. Rankin.* **274**, 359, 127-F4 (1983)
- The Optical Luminosity of Very Fast Pulsars. *F. Pacini and M. Salvati.* **274**, 369, 127-F14 (1983)
- Discovery of 9.3 s X-Ray Pulsations from 2S 1553–542 and a Determination of the Orbit. *R. L. Kelley, S. Rappaport, and S. Ayasli.* **274**, 765, 133-F8 (1983)
- A New Model for the Emission Geometry in PSR 0950+08. *Ramesh Narayan and M. Vivekanand.* **274**, 771, 133-F14 (1983)
- X-Ray Emission from Radio Pulsar Winds. *Andrew F. Cheng.* **275**, 790, 146-B13 (1983)
- JPL Pulsar Timing Observations. II. Geocentric Arrival Times. *G. S. Downs and P. E. Reichley.* **53**, 169, 18-F2 (1983) (Abstr. in **271**, 894, 99-C2)

**Quantum Mechanics**

- A Theoretical Investigation of the Radiative Properties of the CN Red and Violet Systems. *Mats Larsson, Per E. M. Siegbahn, and Hans Ågren.* **272**, 369, 105-A10 (1983)
- Oscillator Strengths of  $3p^3d^2D \rightarrow 3p^3d^4s^2P^o, ^2F^o$  Transitions in Co IX, Cu XI, and Zn XII Ions. *S. N. Tiwary.* **272**, 781, 110-C6 (1983)

**Quasars**

- 21 Centimeter H I Absorption at  $z = 0.437$  against the Extended Radio Structure of 3C 196. *Robert L. Brown and Kenneth J. Mitchell.* **264**, 87, 1-G7 (1983)

- Accurate Formula for the Self-Compton X-Ray Flux Density from a Uniform, Spherical, Compact Radio Source. *Alan P. Marscher.* **264**, 296, 4-B1 (1983)
- Feeding Quasars with Stellar Winds. *J. Michael Shull.* **264**, 446, 7-B11 (1983)
- Low Frequency Asymptotic Spectra of Multiple, Decelerating Adiabatic Bursts. *Peter D. Usher, Ke-Liang Huang, Kenneth J. Mitchell, and Joseph T. Pollock.* **264**, 451, 7-C2 (1983)
- The Motion of Short-Wavelength Photons in Gravitating, Refractive Media. *Thomas W. Noonan.* **264**, 627, 9-B9 (1983)
- Infrared/Optical Energy Distributions of High-Redshift Quasars. *B. T. Soifer, G. Neugebauer, J. B. Oke, K. Matthews, and J. H. Lacy.* **265**, 18, 12-B12 (1983)
- Theoretical Quasar Emission-Line Profiles. I. Curve-of-Growth Effects on Observed Profiles. *E. N. Hubbard and R. C. Puetter.* **265**, 35, 12-D10 (1983)
- Optical and Radio Structure of the Quasar PKS 0812+02. *S. Wyckoff, K. Johnston, F. Ghigo, L. Rudnick, P. Wehinger, and A. Boksenberg.* **265**, 43, 12-E4 (1983)
- Spectrophotometry of the Broad Absorption-Line QSO PHL 5200. *Vesa T. Junkkarinen, E. Margaret Burbidge, and Harding E. Smith.* **265**, 51, 12-E13 (1983)
- A Non-Spherically Symmetric Model for Absorption Regions near Quasars. *Vesa T. Junkkarinen.* **265**, 73, 12-G7 (1983)
- The Optical Scalar Equations in the Presence of a Refractive Medium. *Thomas W. Noonan.* **265**, 451, 17-A5 (1983)
- 1107+036: An Unusual QSO-Galaxy Pair. *H. S. Murdoch, R. W. Hunstead, H. C. Arp, J. J. Condon, J. C. Blades, and E. M. Burbidge.* **265**, 610, 19-C4 (1983)
- On the Origin of Relativistic Particles and Gamma-Rays in Quasars. *R. J. Protheroe and D. Kazanas.* **265**, 620, 19-D1 (1983)
- Simultaneous Visual-Infrared Polarimetry of QSOs. *J. J. Puschell, T. W. Jones, A. C. Phillips, L. Rudnick, E. Simpson, M. Sitko, W. A. Stein, and A. Moneti.* **265**, 625, 19-D6 (1983)
- Spectroscopy of the Fuzz Associated with Four Quasars. *Bruce Balick and T. M. Heckman.* **265**, L1, 18-D14 (1983)
- 3C 395—A Quasar with Asymmetrical Radio Structure. *K. J. Johnston, J. H. Spencer, A. Witzel, and E. B. Fomalont.* **265**, L43, 26-A11 (1983)
- The Arc Second Radio Structure of 12 BL Lacertae Objects. *J. S. Ulvestad, K. J. Johnston, and K. W. Weiler.* **266**, 18, 27-B9 (1983)
- Prominent Ultraviolet Emission Lines from Type I Seyfert Galaxies. *Chi-Chao Wu, Albert Boggess, and Theodore R. Gull.* **266**, 28, 27-C5 (1983)
- Paired Quasars near NGC 2639: Evidence for Quasars in Superclusters? *Holland Ford, Robin Ciardullo, and Richard Harms.* **266**, 451, 33-C4 (1983)
- Studies of BL Lacertae Objects with the Einstein X-Ray Observatory: The Absolute Volume Density. *Daniel A. Schwartz and William H.-M. Ku.* **266**, 459, 33-C13 (1983)
- The Polarization of Seyfert Galaxies. *P. G. Martin, I. B. Thompson, J. Maza, and J. R. P. Angel.* **266**, 470, 33-D10 (1983)
- The Dynamics and Fueling of Active Nuclei. *Colin Norman and Joseph Silk.* **266**, 502, 33-F14 (1983)
- Opacity Effects at Radio Wavelengths in the Quasar 1308+326. *C. P. O'Dea, W. A. Dent, and T. J. Balonek.* **266**, L1, 32-A2 (1983)
- The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. *T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger.* **266**, L73, 39-A4 (1983)
- A Wind and Shock Model for Active Galactic Nuclei. *M. Camenzind and Thierry J.-L. Courvoisier.* **266**, L83, 39-A13 (1983)
- Quasar Evolution: Not a Deficit at "Low" Redshifts. *Y. Avni and N. Schiller.* **267**, 1, 40-A6 (1983)

- The Distribution of Quasars from a Small Area Survey. *Yaoquan Chu and Xingfen Zhu*. **267**, 4, 40-A9 (1983)
- High-Resolution Spectroscopy of Selected Absorption Lines toward Quasi-stellar Objects. I. Lyman-Alpha toward PHL 957. *Frederic H. Chaffee, Jr., Ray J. Weymann, David W. Latham, and Peter A. Strittmatter*. **267**, 12, 40-B3 (1983)
- Spherical Accretion onto Quasars. *Julian H. Krolik and Richard A. London*. **267**, 18, 40-B9 (1983)
- Nebular Dust and Extinction in Ionized Nebulae. I. The Balmer Decrement. *John S. Mathis*. **267**, 119, 41-C4 (1983)
- The Statistics of Gravitational Lenses: Apparent Changes in the Luminosity Function of Distant Sources Due to Passage of Light through a Single Galaxy. *Mario Vietri and Jeremiah P. Ostriker*. **267**, 488, 46-B14 (1983)
- The Ultraviolet Spectrum of the Seyfert Galaxies NGC 3516 and NGC 5548. *M. H. Ulrich and C. Boisson*. **267**, 515, 46-D13 (1983)
- Detection of 21 Centimeter Absorption at  $z = 1.94$  in the QSO PKS 1157+014: Erratum. *A. M. Wolfe, F. H. Briggs, and D. L. Jauncey*. **267**, 891, 50-D13 (1983) (Orig. paper in **248**, 460, 86-F1)
- PKS 0119-046 and the Origin of Infalling Absorption-Line Systems in Quasars. *C. Martin Gaskell*. **267**, L1, 45-B2 (1983)
- X-Ray Studies of Quasars with the Einstein Observatory. III. The 3CR Sample. *H. Tananbaum, J. F. C. Wardle, G. Zamorani, and Y. Avni*. **268**, 60, 52-E9 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. *R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek*. **268**, 68, 52-F3 (1983)
- The Incidence of 21 Centimeter Absorption in QSO Redshift Systems Selected for Mg II Absorption: Evidence for a Two-Phase Nature of the Absorbing Gas. *F. H. Briggs and A. M. Wolfe*. **268**, 76, 52-F11 (1983)
- The Ultraviolet Excess of Luminous Quasars. II. Evidence for Massive Accretion Disks. *Matthew A. Malkan*. **268**, 582, 59-D4 (1983)
- Reddening Indicators for Quasars and Seyfert 1 Galaxies. *Steven A. Grandi*. **268**, 591, 59-D13 (1983)
- Why High-Latitude Clouds in Our Galaxy and the Highly Redshifted Clouds Observed in Front of QSOs Do Not Belong to the Same Parent Population. *A. M. Wolfe*. **268**, L1, 57-A3 (1983)
- Common Absorption Systems in the Spectra of the QSO Pair Q0307-195A. *B. Peter A. Shaver and J. Gordon Robertson*. **268**, L57, 63-D4 (1983)
- Physical Properties of the Intergalactic Medium and the Lyman-Alpha Absorbing Clouds. *Jeremiah P. Ostriker and Satoru Ikeuchi*. **268**, L63, 63-D9 (1983)
- On the Association of Galaxies and QSOs. *Howard B. French and James E. Gunn*. **269**, 29, 65-C10 (1983)
- Analysis of Complete Quasar Samples to Obtain Parameters of Luminosity and Evolution Functions. *H. L. Marshall, Y. Avni, H. Tananbaum, and G. Zamorani*. **269**, 35, 65-D2 (1983)
- Analysis of Complete Quasar Samples to Obtain Parameters of Luminosity and Evolution Functions. *H. L. Marshall, Y. Avni, H. Tananbaum, and G. Zamorani*. **269**, 35, 65-D2 (1983)
- Optical and X-Ray Observations of Faint Quasars in an Optically Selected Sample. *H. L. Marshall, H. Tananbaum, G. Zamorani, J. P. Huchra, A. Braccetti, and V. Zitelli*. **269**, 42, 65-D9 (1983)
- Relativistic Thermal Plasmas: Effects of Magnetic Fields. *Suguru Araki and Alan P. Lightman*. **269**, 49, 65-E2 (1983)
- Quasar Evolution and Gravitational Collapse. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti*. **269**, 57, 65-E10 (1983)
- Spectroscopy of Variable Blue Stellar Objects. *Peter D. Usher, Archibald Warnock III, and Richard F. Green*. **269**, 73, 65-F12 (1983)
- Quasar Evolution Derived from the Palomar Bright Quasar Survey and Other Complete Quasar Surveys. *Maarten Schmidt and Richard F. Green*. **269**, 352, 70-B9 (1983)
- The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. *R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin*. **269**, 375, 70-E2 (1983)
- A Statistical VLBI Study of Milli-Arcsecond Cores in Extragalactic Radio Sources. *Robert A. Preston, David D. Morabito, and David L. Jauncey*. **269**, 387, 70-F8 (1983)
- Rectilinear Motions in 3C 345. *M. H. Cohen, S. C. Unwin, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **269**, L1, 69-A3 (1983)
- Neutral Hydrogen Absorption in the Quasar 3C 268.4: Possible Evidence for Galactic Halo Clouds. *Aubrey D. Haschick, Patrick C. Crane, and Willem A. Baan*. **269**, L43, 76-B3 (1983)
- Discovery of a Quasar with a Wide Angle Radio Tail in a Distant Cluster of Galaxies. *D. E. Harris, P. E. Dewdney, C. H. Costain, H. Butcher, and A. G. Willis*. **270**, 39, 77-D4 (1983)
- The  $V/V_{\max}$  Test for QSOs: Comments on the Paper by Hawkins and Stewart. *D. Wills*. **270**, 48, 77-D13 (1983)
- Radio and X-Ray Observations of the Radio Halo Source in A1367. *G. Gavazzi and G. Trinchieri*. **270**, 410, 82-E12 (1983)
- VLBI Maps of 3C 147, 3C 286, 3C 380, NRAO 150, CTD 93, and 3C 395 at 2.3 GHz. *R. B. Phillips and D. B. Shaffer*. **271**, 32, 88-C9 (1983)
- VLBI Observations of the Radio Sources 0552+398 and 1848+283: Measurements of the Departure from Equipartition. *Steven R. Spangler, Robert L. Mutel, and John M. Benson*. **271**, 44, 88-D7 (1983)
- Radio Observations of Steep-Spectrum Compact Sources. *W. D. Cotton*. **271**, 51, 88-D14 (1983)
- Compton Heated Winds and Coronae above Accretion Disks. I. Dynamics. *Mitchell C. Begelman, Christopher F. McKee, and Gregory A. Shields*. **271**, 70, 88-F9 (1983)
- Compton Heated Winds and Coronae above Accretion Disks. II. Radiative Transfer and Observable Consequences. *Mitchell C. Begelman and Christopher F. McKee*. **271**, 89, 89-A1 (1983)
- CCD Photometry of the BL Lacertae Object 1400+162 and the Associated Group of Galaxies. *Donna Weistrop, David B. Shaffer, Harold J. Reitsema, and Bradford A. Smith*. **271**, 471, 94-E11 (1983)
- Further Observations and Analysis of Quasars Near Companion Galaxies. *Halton Arp*. **271**, 479, 94-F5 (1983)
- Does the Association of Quasars with Galaxies Depend on the Morphological Type of Galaxy? *Yaoquan Chu and Xingfen Zhu*. **271**, 507, 95-A12 (1983)
- VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. *Isabella M. Gioia, E. D. Feigelson, T. Macacaro, R. Schild, and G. Zamorani*. **271**, 524, 95-C1 (1983)
- The Relationship between the X-Ray and Optical Luminosities for QSOs. *W. H. Tucker*. **271**, 531, 95-C8 (1983)
- Superluminal Motion in the Quasar 3C 345. *S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **271**, 536, 95-C13 (1983)
- The Caustics of Gravitational "Lenses". *Hans C. Ohanian*. **271**, 551, 95-D14 (1983)
- The Emission-Line Gas in Quasars and Active Nuclei: Implications for the Nature of Core-Dominant Radio Sources. *Timothy M. Heckman*. **271**, L5, 93-A6 (1983)
- Density of Quasars around Companion Galaxies: Addendum. *Halton Arp*. **271**, L41, 93-D2 (1983) (Orig. paper in **263**, L9, 136-D9)

## Quasars—Continued

- Why High-Latitude Clouds in Our Galaxy and the Highly Redshifted Clouds Observed in Front of QSOs Do Not Belong to the Same Parent Population: Erratum. *A. M. Wolfe*. **271**, L43, 93-D3 (1983) (Orig. paper in **268**, L1, 57-A3)
- Discovery of a Redshift  $z = 1.2$  Quasar with a Flat Radio Spectrum in the Field of the Gamma-Ray Source CG 195+04. *A. F. J. Moffat, R. Schlickeiser, M. M. Shara, W. Sieber, R. Tuffs, and H. Kühr*. **271**, L45, 100-A4 (1983)
- Optical Variability, Absolute Luminosity, and the Hubble Diagram for QSOs. *Andrew J. Pica and Alex G. Smith*. **272**, 11, 101-B2 (1983)
- The Dynamics of Dissipatively Heated Spherical Accretion. *Ernst T. Scharlemann*. **272**, 279, 104-A9 (1983)
- VLBI Maps of 3C 273 and 3C 345 at 2.3 GHz. *M. H. Cohen, S. C. Unwin, K. R. Lind, A. T. Moffet, R. S. Simon, P. N. Wilkinson, R. E. Spencer, R. S. Booth, G. D. Nicolson, A. E. Niell, and L. E. Young*. **272**, 383, 106-A5 (1983)
- Reverse Stellar Evolution, Stellar Ablation, and the Origin of Gas in Quasars. *William G. Mathews*. **272**, 390, 106-A12 (1983)
- An Infrared and Optical Investigation of Galactic Nuclei with Compact Radio Sources. *T. M. Heckman, M. J. Lebofsky, G. H. Rieke, and W. van Breugel*. **272**, 400, 106-B8 (1983)
- Luminosity Function of High-Redshift Quasars. *Barbara Gaston*. **272**, 411, 106-C5 (1983)
- Neutral Interstellar Gas in the Lower Galactic Halo. *C. E. Albert*. **272**, 509, 107-C14 (1983)
- Common Lyman-Alpha Absorption Lines in the Triple QSO PG 1115+08. *Ray J. Weymann and Craig B. Foltz*. **272**, L1, 105-D2 (1983)
- Expected Number of Multiple QSOs from Galaxy and QSO Surface Density Data. *J. A. Tyson*. **272**, L41, 111-A4 (1983)
- Theoretical Quasar Emission-Line Profiles. II. Effects of Source Function Variation and Total Thickness. *R. C. Puetter and E. N. Hubbard*. **273**, 36, 112-E2 (1983)
- A Single Exhaust Model for Backward Emission in Doppler Quasars. *J. V. Narlikar and K. Subramanian*. **273**, 44, 112-E10 (1983)
- Millimeter and Submillimeter Observations of 3C 273. *P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low*. **273**, 58, 112-F10 (1983)
- The Radio Structure of 3C 279. *Imke de Pater and Richard A. Perley*. **273**, 64, 112-G2 (1983)
- The X-Ray Spectra of the BL Lacertae Objects PKS 0548-322 and 3C 66A. *Dario Maccagni, Tommaso Maccacaro, and Massimo Tarenghi*. **273**, 70, 112-G8 (1983)
- The Oxygen Abundance in the Clouds Producing the Ly $\alpha$ -Ly $\beta$  Absorption Systems in the Quasars 4C 5.34 (0805+046) and OQ 172 (1442+101). *John Norris, F. D. A. Hartwick, and B. A. Peterson*. **273**, 450, 118-D4 (1983)
- Quasar Evolution and Gravitational Collapse: Erratum. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti*. **273**, 837, 122-F6 (1983) (Orig. paper in **269**, 57, 65-E10)
- A Cosmological Test: Its Application to Quasars and Estimates of  $q_0$ . *Ermanno F. Borra*. **273**, L55, 123-A8 (1983)
- Shocks and Spherically Accreting Black Holes: A Model for Classical Quasars. *P. Mészáros and J. P. Ostriker*. **273**, L59, 123-A12 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fanti, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puscell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea*. **274**, 101, 125-A9 (1983)
- Broad-Line Kinematic Models and the Forbidden Line Emission in Quasars and Seyfert Galaxies. *T. J. Carroll and John Kwan*. **274**, 113, 125-B7 (1983)
- Interstellar Absorption Lines in the Spectrum of 3C 273. *D. G. York, C. C. Wu, S. Ratcliff, J. C. Blades, L. L. Cowie, and D. C. Morton*. **274**, 136, 125-D2 (1983)
- The V/V $_m$  Test in Hoyle-Narlikar Conformal Gravity. *V. K. Kulkarni and D. G. Banhatti*. **274**, 469, 130-C3 (1983)
- A Thermal Interpretation of the X-Ray Spectra of Quasars, Active Galactic Nuclei, and Cygnus X-1. *P. Mészáros*. **274**, L13, 129-A12 (1983)
- Luminosity Correlations in Quasars. *Gary A. Chanan*. **275**, 45, 137-D9 (1983)
- High-Velocity Absorbing Cloudlets as Potential Contributors to Observed Quasar Continua. *Ronald G. Eastman, Gordon M. MacAlpine, and Douglas O. Richstone*. **275**, 53, 137-E3 (1983)
- Broad Emission Features in QSOs and Active Galactic Nuclei. I. New Calculations of Fe II Line Strengths. *Hagai Netzer and Beverley J. Wills*. **275**, 445, 142-D4 (1983)
- VLBI Observations of the QSO 4C 49.22. *Roger Linfield*. **275**, 461, 142-E6 (1983)
- The Most Luminous Quasar: S5 0014+81. *Helmut Kühr, James W. Liebert, Peter A. Strittmatter, Gary D. Schmidt, and Craig Mackay*. **275**, L33, 148-B1 (1983)
- The Case Low-Dispersion Northern Sky Survey. I. *Peter Pesch and N. Sanduleak*. **51**, 171, 3-D1 (1983) (Abstr. in **263**, 1006, 142-F7)
- A Catalog of High Accuracy Circular Polarization Measurements. *Kurt W. Weiler and Imke de Pater*. **52**, 293, 13-D12 (1983) (Abstr. in **269**, 808, 75-C7)
- Radio Recombination Lines from Quasars. I. Level Populations of Hydrogenic Ions in a Strong, Nonthermal Radiation Field. *E. James Wadiak, Craig L. Sarazin, and Robert L. Brown*. **53**, 351, 21-E3 (1983) (Abstr. in **272**, 785, 110-C10)
- Radar Astronomy**
- Spectral Broadening of Planetary Radar Signals by the Solar Wind. *J. K. Harmon and W. A. Coles*. **270**, 748, 86-C3 (1983)
- Radial Velocities**
- Precise Radial Velocities. II. A Possible Detection of Oscillations or Running Waves in Aldebaran and Arcturus. *Myron A. Smith*. **265**, 325, 15-F2 (1983)
- Kinematics of the Late M Stars in the Galactic Nuclear Bulge. *J. R. Mould*. **266**, 255, 29-F6 (1983)
- The Binary Nature of the Barium Stars. II. Velocities, Binary Frequency, and Preliminary Orbits. *Robert D. McClure*. **268**, 264, 54-G3 (1983)
- Velocity Dispersion of Planetary Nebulae in the Nuclear Bulge of M31. *David G. Lawrie*. **273**, 562, 119-F8 (1983)
- Radial Velocities of Planetary Nebulae. *Stephen E. Schneider, Yervant Terzian, A. Purgathofer, and M. Perinotto*. **52**, 399, 15-G5 (1983) (Abstr. in **270**, 779, 86-E6)
- Ultraviolet and Optical Studies of Binaries with Luminous Cool Primaries and Hot Companions. III. Reticon Radial Velocities. *Sidney B. Parsons*. **53**, 553, 24-E1 (1983) (Abstr. in **273**, 839, 122-F9)
- AB Stars in the Southern Galactic Halo. II. Spectroscopy and Radial Velocities. *Jeffrey R. Pier*. **53**, 791, 27-E2 (1983) (Abstr. in **274**, 922, 135-E3)
- Radiation Mechanisms**
- Low Frequency Asymptotic Spectra of Multiple, Decelerating Adiabatic Bursts. *Peter D. Usher, Ke-Liang Huang, Ken-*



- neth J. Mitchell, and Joseph T. Pollock. **264**, 451, 7-C2 (1983)
- The Near-Infrared Spectrum of the Herbig Ae-Be Stars. D. Lorenzetti, P. Saraceno, and F. Strafella. **264**, 554, 8-C13 (1983)
- The Fiber Fine Structure during Solar Type IV Radio Bursts: Observations and Theory of Radiation in Presence of Localized Whistler Turbulence. Thomas E. X. Bernold and Rudolf A. Treumann. **264**, 677, 9-F4 (1983)
- Electron Kinetic Equations for Comptonization by Isotropic Photons. Naoki Iwamoto. **265**, 1021, 24-A1 (1983)
- Why Are Broad Emission Lines Seen in Seyfert Galaxies and Not in BL Lacertae Objects? P. W. Guilbert, A. C. Fabian, and Richard McCray. **266**, 466, 33-D6 (1983)
- A Wind and Shock Model for Active Galactic Nuclei. M. Camenzind and Thierry J.-L. Courvoisier. **266**, L83, 39-A13 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek. **268**, 68, 52-F3 (1983)
- Spatially Extended Narrow Emission-Line Gas in the Seyfert Galaxy NGC 4151. Timothy M. Heckman and Bruce Balick. **268**, 102, 53-A9 (1983)
- Extended Soft X-Ray Emission from NGC 4151. Martin Elvis, Ulrich G. Briel, and J. Patrick Henry. **268**, 105, 53-A13 (1983)
- Relativistic Thermal Plasmas: Effects of Magnetic Fields. Suguru Araki and Alan P. Lightman. **269**, 49, 65-E2 (1983)
- X-Ray Observations of 20 3CR Radio Galaxies and Their Environments. Eric D. Feigelson and Christophe J. Berg. **269**, 400, 70-G7 (1983)
- VLA Observations of a Solar Active Region and Coronal Loops. D. McDonnell and M. R. Kundu. **269**, 698, 74-A13 (1983)
- The Impulsive Phase of Solar Flares. II. Characteristics of the Hard X-Rays. John Leach and Vahé Petrosian. **269**, 715, 74-C12 (1983)
- The Correlated X-Ray and Optical Time Variability of TT Arietis. K. A. Jensen, France A. Córdova, J. Middleditch, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer. **270**, 211, 79-B14 (1983)
- The Thermal Pair Annihilation Spectrum: A Detailed Balance Approach. Roland Svensson. **270**, 300, 80-B11 (1983)
- Measurements of Galactic Plane Gamma-Ray Emission in the Energy Range 10-80 MeV. D. L. Bertsch and D. A. Kniffen. **270**, 305, 80-C2 (1983)
- Radio and X-Ray Observations of the Radio Halo Source in A1367. G. Gavazzi and G. Trinchieri. **270**, 410, 82-E12 (1983)
- A Search for X-Ray Emission from Optically Quiet, Compact Radio Sources. J. E. Ledden and S. L. O'Dell. **270**, 434, 83-A1 (1983)
- Arp 102B: A New and Unusual Broad-Line Galaxy. John Stauffer, Rudolph Schild, and William Keel. **270**, 465, 83-C3 (1983)
- Radio Observations of Steep-Spectrum Compact Sources. W. D. Cotton. **271**, 51, 88-D14 (1983)
- X-Rays from Radio Pulsars: The Detection of PSR 1055-52. Andrew F. Cheng and David J. Helfand. **271**, 271, 91-A4 (1983)
- Pulselike Character of Blackbody Radiation from Neutron Stars. George Greenstein and Gregory J. Hartke. **271**, 283, 91-B2 (1983)
- Gamma-Rays and the Production of Energetic Electrons in Enshrouding Material: A Model for the Quiescent Radio Emission from Cygnus X-3. W. Thomas Vestrand. **271**, 304, 91-C9 (1983)
- Radio Blips and Hard X-Rays in Solar Flares. A. O. Benz, T. E. X. Bernold, and B. R. Dennis. **271**, 355, 91-G6 (1983)
- Thick-Target Bremsstrahlung Interpretation of Short Time-Scale Solar Hard X-Ray Features. A. Gordon Emslie. **271**, 367, 92-A4 (1983)
- X-Ray Survey of Clusters of Galaxies with the Einstein Observatory. Frank Abramopoulos and William H.-M. Ku. **271**, 446, 94-C6 (1983)
- Superluminal Motion in the Quasar 3C 345. S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker. **271**, 536, 95-C13 (1983)
- Analysis of the Konus Catalog of Gamma-Ray Bursts with the Thermal Synchrotron Model. E. P. Liang, T. E. Jernigan, and R. Rodrigues. **271**, 766, 97-G5 (1983)
- The High-Energy Spectrum of Hot Accretion Disks. Jean A. Eilek and Minas Kafatos. **271**, 804, 98-C5 (1983)
- Star Formation within OB Subgroups: Implosion by Multiple Sources. Richard I. Klein, Maxwell T. Sandford II, and Rodney W. Whitaker. **271**, L69, 100-B12 (1983)
- Stimulated Emission and the Flat Balmer Decrements of Cataclysmic Variable Stars. Moshe Elitzur, G. J. Ferland, W. G. Mathews, and G. A. Shields. **272**, L55, 111-B3 (1983)
- A Single Exhaust Model for Backward Emission in Doppler Quasars. J. V. Narlikar and K. Subramanian. **273**, 44, 112-E10 (1983)
- Millimeter and Submillimeter Observations of 3C 273. P. E. Clegg, W. K. Gear, P. A. R. Ade, E. I. Robson, M. G. Smith, I. G. Nolt, J. V. Radostitz, W. Glaccum, D. A. Harper, and F. J. Low. **273**, 58, 112-F10 (1983)
- The X-Ray Spectra of the BL Lacertae Objects PKS 0548-322 and 3C 66A. Dario Maccagni, Tommaso Maccacaro, and Massimo Tarenghi. **273**, 70, 112-G8 (1983)
- The Inner Radio Structure of Centaurus A: Clues to the Origin of the Jet X-Ray Emission. Jack O. Burns, Eric D. Feigelson, and Ethan J. Schreier. **273**, 128, 113-E6 (1983)
- Radio Emission from AM Herculis: The Quiescent Component and an Outburst. George A. Dulk, Timothy S. Bastien, and G. Channugam. **273**, 249, 115-A7 (1983)
- An Optical Test for the Distance of Gamma-Ray Burst Sources. Mark C. Jennings. **273**, 309, 115-E11 (1983)
- The Atmosphere of a Dirty-Clathrate Cometary Nucleus: A Two-Phase, Multifluid Model. M. L. Marconi and D. A. Mendis. **273**, 381, 116-D5 (1983)
- Upper Limits to O III  $\lambda 5592$  and [Ni IX]  $\lambda 4594$  in Seyfert Galaxies. Donald E. Osterbrock, Oved Dahari, and Jan Olof Ekberg. **273**, L31, 117-D3 (1983)
- The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35 c$ . B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Jostes, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming. **273**, L65, 123-B3 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea. **274**, 101, 125-A9 (1983)
- Long-Term, Hard X-Ray Observations of Scorpius X-1 from HEAO 1. Y. Soong and R. E. Rothschild. **274**, 327, 127-C14 (1983)
- The Optical Luminosity of Very Fast Pulsars. F. Pacini and M. Salvati. **274**, 369, 127-F14 (1983)
- Gamma-Ray Observations toward NGC 1275, and the Origin of the Emission in the Infrared, X-Rays, and Gamma-Rays. A. W. Strong and G. F. Bignami. **274**, 549, 131-C6 (1983)
- A New Model for the Emission Geometry in PSR 0950+08. Ramesh Narayan and M. Vivekanand. **274**, 771, 133-F14 (1983)
- Microwave Emission from the Coronae of Late-Type Dwarf Stars. Jeffrey L. Linsky and Dale E. Gary. **274**, 776, 133-G5 (1983)
- Tidal Gravitational Radiation from Homogeneous Stars. Clif-

**Radiation Mechanisms—Continued**

- ford M. Will. **274**, 858, 134-F6 (1983)
- Observed Time Delays between Solar H $\alpha$  Flares and Microwave Bursts as Evidence for Various Energy Transport Mechanisms. N. Kämpfer and A. Magun. **274**, 910, 135-D5 (1983)
- Galactic Absorption of High-Energy Gamma-Rays from Cygnus X-3. Robert J. Gould. **274**, L23, 129-B7 (1983)
- Stochastic Three-Wave Interaction in Flaring Solar Loops. Loukas Vlahos, R. R. Sharma, and K. Papadopoulos. **275**, 374, 141-A12 (1983)
- X-Ray Studies of BL Lacertae Objects with the Einstein Observatory: Confrontation with the Synchrotron Self-Compton Predictions. Greg M. Madejski and Daniel A. Schwartz. **275**, 467, 142-E12 (1983)
- Linear Polarization Measurements of the AM Herculis Objects H0139-68 and E1405-451. N. Visvanathan and I. Tuohy. **275**, 709, 145-C6 (1983)
- X-Ray Emission from Radio Pulsar Winds. Andrew F. Cheng. **275**, 790, 146-B13 (1983)
- Neutrino-Pair Bremsstrahlung in Dense Stars. I. Liquid Metal Case. Naoki Itoh and Yasuhiro Kohyama. **275**, 858, 147-A1 (1983)
- Optical Radiation Associated with Gamma-Ray Bursts. Richard A. London and Lynn R. Cominsky. **275**, L59, 148-C14 (1983)
- Radio Recombination Lines from Quasars. I. Level Populations of Hydrogenic Ions in a Strong, Nonthermal Radiation Field. E. James Wadiak, Craig L. Sarazin, and Robert L. Brown. **53**, 351, 21-E3 (1983) (Abstr. in **272**, 785, 110-C10)

**Radiative Transfer**

- MHD Stability of Incompressible Coronal Loops with Radiative Energy Loss. Chang-Hyuk An. **264**, 302, 4-B7 (1983)
- The Motion of Short-Wavelength Photons in Gravitating, Refractive Media. Thomas W. Noonan. **264**, 627, 9-B9 (1983)
- Theoretical Quasar Emission-Line Profiles. I. Curve-of-Growth Effects on Observed Profiles. E. N. Hubbard and R. C. Puetter. **265**, 35, 12-D10 (1983)
- A Non-Spherically Symmetric Model for Absorption Regions near Quasars. Vesa T. Junkkarinen. **265**, 73, 12-G7 (1983)
- The Eddington Limit and Supercritical Accretion. II. Time-dependent Calculations. H. L. Burger and J. I. Katz. **265**, 393, 16-D3 (1983)
- The Optical Scalar Equations in the Presence of a Refractive Medium. Thomas W. Noonan. **265**, 451, 17-A5 (1983)
- Flare Loop Radiative Hydrodynamics. I. Basic Methods. A. N. McClymont and Richard C. Canfield. **265**, 483, 17-C9 (1983)
- Flare Loop Radiative Hydrodynamics. II. Thermal Stability of Empirical Models. A. N. McClymont and Richard C. Canfield. **265**, 497, 17-D9 (1983)
- Flare Loop Radiative Hydrodynamics. III. Nonlocal Radiative Transfer Effects. Richard C. Canfield, George H. Fisher, and A. N. McClymont. **265**, 507, 17-E5 (1983)
- An Alternative Model for the Atmospheres of Wolf-Rayet and O Stars. Anne B. Underhill. **265**, 933, 23-A9 (1983)
- Spectral and Temporal Effects of a Plasma Shell around an X-Ray Source. Kar Man Chang and Nikolaos D. Kylafis. **265**, 1005, 23-F11 (1983)
- Electron Kinetic Equations for Comptonization by Isotropic Photons. Naoki Iwamoto. **265**, 1021, 24-A1 (1983)
- Comments on the Dynamical Effects of Radiative Viscosity. Dimitri Mihalas. **266**, 242, 29-E7 (1983)
- The Acceleration of Molecular Hydrogen Clouds through Radiative Dissociation. Martin Harwit and Johannes Schmid-Burgk. **266**, 602, 34-G6 (1983)
- Flux-Limited Diffusion with Relativistic Corrections. G. C. Pomraning. **266**, 841, 37-E4 (1983)
- Polarization of Interstellar Radio-Frequency Lines and Magnetic Field Direction. Nikolaos D. Kylafis. **267**, 137, 41-D8 (1983)
- Flare Loop Radiative Hydrodynamics. IV. Dynamic Evolution of Unstable Semiempirical Loop Models. Chang-Hyuk An, Richard C. Canfield, George H. Fisher, and A. N. McClymont. **267**, 421, 44-D5 (1983)
- UV Radiation Field inside Dense Clouds: Its Possible Existence and Chemical Implications. Sheo S. Prasad and Shankar P. Tarafdar. **267**, 603, 47-D5 (1983)
- A Thermal Model of Sunspot Influence on Solar Luminosity. P. Foukal, L. A. Fowler, and M. Livshits. **267**, 863, 50-B13 (1983)
- Transfer of Polarized Radiation in Astronomical Masers. L. R. Western and W. D. Watson. **268**, 849, 62-D3 (1983)
- Absorption of Radiation Propagating Obliquely in a Magnetoplasma. A. Khandker, R. F. O'Connell, and G. W. Ford. **269**, 668, 73-F11 (1983)
- Image Distortion by Gravitational Lensing. Thomas W. Noonan. **270**, 245, 79-E10 (1983)
- Time-Dependent Scattering in Resonance Lines. Paul B. Kunasz. **271**, 321, 91-D12 (1983)
- Second-Order Escape Probability Approximations in Radiative Transfer: Erratum. D. G. Hummer and George B. Rybicki. **271**, 888, 99-B10 (1983) (Orig. paper in **263**, 925, 141-G7)
- Stellar Winds Driven by Multiline Scattering. David B. Friend and John I. Castor. **272**, 259, 103-G3 (1983)
- H I Lyman-Alpha in the Sun: The Effects of Partial Redistribution in the Line Wings. D. Roussel-Dupré. **272**, 723, 109-F3 (1983)
- A Static Model of Chromospheric Heating in Solar Flares. Paul J. Ricchiazzi and Richard C. Canfield. **272**, 739, 109-G5 (1983)
- Polarization of Interstellar Molecular Radiofrequency Absorption Lines. Nikolaos D. Kylafis and Paul R. Shapiro. **272**, L35, 105-F12 (1983)
- Theoretical Quasar Emission-Line Profiles. II. Effects of Source Function Variation and Total Thickness. R. C. Puetter and E. N. Hubbard. **273**, 36, 112-E2 (1983)
- The Formation of Emission Lines in the Expanding Chromospheres of Luminous Cool Stars. I. The Importance of Atmospheric Extension and Partial Redistribution Effects. S. A. Drake and J. L. Linsky. **273**, 299, 115-E1 (1983)
- On the Propagation of Acoustic Waves in a Radiating Fluid. Dimitri Mihalas and Barbara Weibel Mihalas. **273**, 355, 116-B6 (1983)
- Discovery of a Large Intergalactic H I Cloud in the M96 Group. Stephen E. Schneider, George Helou, Edwin E. Salpeter, and Yervant Terzian. **273**, L1, 117-B2 (1983)
- Geometrical Effects on the Emission Properties of Astronomical Masers: Linear Polarization and Apparent Size. L. R. Western and W. D. Watson. **274**, 195, 126-A5 (1983)
- The Specific Luminosity of a Three-dimensional Medium in Terms of the Escape Probability. George B. Rybicki and D. G. Hummer. **274**, 380, 127-G11 (1983)
- Radiatively Induced Star Formation. T. N. LaRosa. **274**, 815, 134-C5 (1983)
- Linear Polarization of Interstellar Radio-Frequency Absorption Lines and Magnetic Field Direction. Nikolaos D. Kylafis. **275**, 135, 138-E4 (1983)
- H<sub>2</sub>O Heating in Molecular Clouds: Line Transfer and Thermal Balance in a Warm Dusty Medium. Takamasa Takahashi, David J. Hollenbach, and Joseph Silk. **275**, 145, 138-E14 (1983)
- Linear Polarization of Astronomical Masers by Anisotropic Pumping and Its Enhancement Due to Geometry. L. R. Western and W. D. Watson. **275**, 195, 139-B11 (1983)
- The Spherical Harmonics Solution for the Radiation Field in Plane-parallel Clouds with Embedded Sources. W. G. Rob-

erge. **275**, 292, 140-B14 (1983)

Evidence for X-Ray Scattering by Interstellar Dust. *R. C. Catura*. **275**, 645, 144-E12 (1983)

Curves for Analysis of the Two Lowest Rotational Transitions of Carbon Monoxide Using the Large Velocity Gradient Radiative Transfer Model. *Paul F. Goldsmith, Judith S. Young, and William D. Langer*. **51**, 203, 4-C1 (1983) (Abstr. in **264**, 748, 10-D12)

#### Radio Sources: Extended

Absence of Pulsar Ghost Remnants. *N. L. Cohen, W. D. Cotton, B. J. Geldzahler, and J. M. Marcaide*. **264**, 273, 3-G4 (1983)

A Multiwavelength Comparison of Cassiopeia A and Tycho's Supernova Remnant: Erratum. *John R. Dickel, Stephen S. Murray, Jeffrey Morris, and Donald C. Wells*. **264**, 746, 10-D10 (1983) (Orig. paper in **257**, 145, 62-E6)

The Nuclear Radio Source of the X-Ray Galaxy NGC 2110. *James S. Ulvestad and Andrew S. Wilson*. **264**, L7, 5-A8 (1983)

The Arc Second Radio Structure of 12 BL Lacertae Objects. *J. S. Ulvestad, K. J. Johnston, and K. W. Weiler*. **266**, 18, 27-B9 (1983)

Infrared Observations of the Jet in M87. *R. M. Smith, G. V. Bicknell, A. R. Hyland, and T. J. Jones*. **266**, 69, 27-F4 (1983)

High-Resolution Radio and X-Ray Observations of the Supernova Remnant W28. *M. D. Andrews, J. P. Basart, R. C. Lamb, and R. H. Becker*. **266**, 684, 35-F8 (1983)

MSH 15-52: A Supernova Remnant Containing Two Compact X-Ray Sources. *F. D. Seward, F. R. Harnden, Jr., P. Murdin, and David H. Clark*. **267**, 698, 48-D4 (1983)

Rectilinear Motions in 3C 345. *M. H. Cohen, S. C. Unwin, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **269**, L1, 69-A3 (1983)

Discovery of a Quasar with a Wide Angle Radio Tail in a Distant Cluster of Galaxies. *D. E. Harris, P. E. Dewdney, C. H. Costain, H. Butcher, and A. G. Willis*. **270**, 39, 77-D4 (1983)

Observations of the M87 Jet at 15 GHz with 0".12 Resolution. *J. A. Biretta, Frazer N. Owen, and Philip E. Hardee*. **274**, L27, 129-B10 (1983)

#### Radio Sources: Galaxies

The Nuclear Radio Source of the X-Ray Galaxy NGC 2110. *James S. Ulvestad and Andrew S. Wilson*. **264**, L7, 5-A8 (1983)

The H I Absorption in NGC 5128 (Centaurus A). *J. M. van der Hulst, W. F. Golisch, and A. D. Haschick*. **264**, L37, 11-A9 (1983)

Radio Structure and Optical Kinematics of the cD Galaxy Hydra A (3C 218). *R. D. Ekers and S. M. Simkin*. **265**, 85, 13-A5 (1983)

Asymmetric Structure in the Nuclei of NGC 1275 and 3C 345. *A. C. S. Readhead, D. H. Hough, M. S. Ewing, R. C. Walker, and J. D. Romney*. **265**, 107, 13-C2 (1983)

The Nature of the Cluster Surrounding 3C 295. *Sidney van den Bergh*. **265**, 606, 19-B14 (1983)

1107+036: An Unusual QSO-Galaxy Pair. *H. S. Murdoch, R. W. Hunstead, H. C. Arp, J. J. Condon, J. C. Blades, and E. M. Burbidge*. **265**, 610, 19-C4 (1983)

A Clamshell for Blandford-Rees Jets. *Vincent Icke*. **265**, 648, 19-F4 (1983)

Optical Emission in the Radio Lobes of Radio Galaxies. II. New Observations of 25 Radio Lobes. *Philippe Crane, J. Anthony Tyson, and William C. Saslaw*. **265**, 681, 20-B3 (1983)

3C 395—A Quasar with Asymmetrical Radio Structure. *K. J. Johnston, J. H. Spencer, A. Witzel, and E. B. Fomalont*. **265**, L43, 26-A11 (1983)

Nearby Galaxies with Seyfert-like Nuclei. *M. M. Phillips, P. A. Charles, and J. A. Baldwin*. **266**, 485, 33-E11 (1983)

VLBI Observations of the Nucleus of Centaurus A. *Robert A. Preston, Ann E. Wehrle, David D. Morabito, David L. Jauncey, Michael J. Battay, R. F. Haynes, Alan E. Wright, and George D. Nicolson*. **266**, L93, 39-B8 (1983)

Star Bursts and the Extraordinary Galaxy NGC 3690. *R. D. Gehrz, R. A. Sramek, and D. W. Weedman*. **267**, 551, 46-G7 (1983)

Anomalous Radio Continuum Features in Edge-on Spiral Galaxies. *E. Hummel, J. H. van Gorkom, and C. G. Kotanyi*. **267**, L5, 45-B6 (1983)

Millimeter-Wavelength Outbursts in the Elliptical Galaxy NGC 1052. *D. S. Heeschen and J. J. Puschell*. **267**, L11, 45-C1 (1983)

H I Absorption in the Peculiar Galaxy NGC 6081. *Gregory D. Bothun and Robert A. Schommer*. **267**, L15, 45-C5 (1983)

Enhanced Radio Emission in Merging Galaxies. *Timothy M. Heckman*. **268**, 628, 59-G11 (1983)

Quasar Evolution and Gravitational Collapse. *A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti*. **269**, 57, 65-E10 (1983)

Pressure Collimation of Supersonic Radio Jets. *Arno Krautter, R. N. Henriksen, and Kayll Lake*. **269**, 81, 65-G6 (1983)

A Statistical VLBI Study of Milli-Arcsecond Cores in Extragalactic Radio Sources. *Robert A. Preston, David D. Morabito, and David L. Jauncey*. **269**, 387, 70-F8 (1983)

X-Ray Observations of 20 3CR Radio Galaxies and Their Environs. *Eric D. Feigelson and Christophe J. Berg*. **269**, 400, 70-G7 (1983)

A Multifrequency Study of Star Formation in the Blue Compact Dwarf Galaxy I Zw 36. *F. Viallefond and Trinh X. Thuan*. **269**, 444, 71-C11 (1983)

The Stability of a Magnetically Confined Radio Jet. *Haldan Cohn*. **269**, 500, 72-A1 (1983)

Neutral Hydrogen Absorption in the Quasar 3C 268.4: Possible Evidence for Galactic Halo Clouds. *Aubrey D. Haschick, Patrick C. Crane, and Willem A. Baan*. **269**, L43, 76-B3 (1983)

Radio Continuum Observations of the Bar of NGC 1097. *Marc P. Ondrechen and J. M. van der Hulst*. **269**, L47, 76-B7 (1983)

The Variations of Radio Luminosity with Epoch and Its Effect on the Angular Diameter-Redshift Relation. *Lesley I. Onuora and S. E. Okoye*. **270**, 360, 82-A14 (1983)

Radio and X-Ray Observations of the Radio Halo Source in A1367. *G. Gavazzi and G. Trinchieri*. **270**, 410, 82-E12 (1983)

Beam Models for Radio Sources. IV. Improved Jet Collimation. *M. Javad Siah and Paul J. Wiita*. **270**, 427, 82-G1 (1983)

A Search for X-Ray Emission from Optically Quiet, Compact Radio Sources. *J. E. Ledden and S. L. O'Dell*. **270**, 434, 83-A1 (1983)

Neutral Hydrogen Absorption in Early Spiral Galaxies. *J. F. Mirabel*. **270**, L35, 87-A7 (1983)

Optical Polarimetry of Broad-Line Radio Galaxies. *Richard J. Rudy, G. D. Schmidt, H. S. Stockman, and Richard L. Moore*. **271**, 59, 88-E8 (1983)

VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. *Isabella M. Gioia, E. D. Feigelson, T. Maccararo, R. Schild, and G. Zamorani*. **271**, 524, 95-C1 (1983)

cD Galaxy Dynamics and An Aged Ridge (Jet) in 3C 338. *Jack O. Burns, Erik Schwendeman, and Richard A. White*. **271**, 575, 95-G2 (1983)

The Emission-Line Gas in Quasars and Active Nuclei: Implications for the Nature of Core-Dominant Radio Sources. *Timothy M. Heckman*. **271**, L5, 93-A6 (1983)

Discovery of a Redshift  $z = 1.2$  Quasar with a Flat Radio Spectrum in the Field of the Gamma-Ray Source CG 195+04. *A. F. J. Moffat, R. Schlickeiser, M. M. Shara, W. Sieber, R. Tuffs, and H. Kühr*. **271**, L45, 100-A4 (1983)

X-Ray, Optical, and Radio Observations of the Blue Galaxy Butcher-Oemler 6 in the 3C 295 Cluster. *J. Patrick Henry*.

**Radio Sources: Galaxies—Continued**

- John T. Clarke, Stuart Bowyer, and Russell J. Lavery. **272**, 434, 106-D14 (1983)
- Shell Structure in NGC 5128. D. F. Malin, P. J. Quinn, and J. A. Graham. **272**, L5, 105-D6 (1983)
- The Inner Radio Structure of Centaurus A: Clues to the Origin of the Jet X-Ray Emission. Jack O. Burns, Eric D. Feigelson, and Ethan J. Schreier. **273**, 128, 113-E6 (1983)
- The Discovery of Optical Emission Knots in the Inner Jet of Centaurus A. Jean Brodie, Ariele Königl, and Stuart Bowyer. **273**, 154, 113-G7 (1983)
- Radio Emission and the Masses of Elliptical Galaxies. Timothy M. Heckman. **273**, 505, 119-B3 (1983)
- Quasar Evolution and Gravitational Collapse: Erratum. A. Cavaliere, E. Giallongo, A. Messina, and F. Vagnetti. **273**, 837, 122-F6 (1983) (Orig. paper in **269**, 57, 65-E10)
- VLA Radio Continuum Observations of the Edge-on Spiral Galaxy NGC 3079. Nebojsa Duric, E. R. Seaquist, Patrick C. Crane, R. C. Bignell, and L. E. Davis. **273**, L11, 117-B12 (1983)
- Radio Jets and High-Velocity Gas in the Seyfert Galaxy NGC 1068. A. S. Wilson and J. S. Ulvestad. **275**, 8, 137-A14 (1983)
- Radio and Optical Observations of the Alleged Optical Jet in DA 240. Wil van Breugel, Timothy Heckman, Alan Bridle, Harvey Butcher, Richard Strom, and Bruce Balick. **275**, 61, 137-E11 (1983)
- Neutral Hydrogen in Isolated Galaxies. III. The Redshift Distribution. Martha P. Haynes and Riccardo Giovanelli. **275**, 472, 142-F3 (1983)
- A Catalog of High Accuracy Circular Polarization Measurements. Kurt W. Weiler and Imke de Pater. **52**, 293, 13-D12 (1983) (Abstr. in **269**, 808, 75-C7)
- A 21 Centimeter Line Survey of a Complete Sample of Interacting and Isolated Galaxies. Lindsey Elspeth Davis and E. R. Seaquist. **53**, 269, 20-C2 (1983) (Abstr. in **272**, 785, 110-C10)
- Strong Radio Sources in Bright Spiral Galaxies. III. Disk Emission. J. J. Condon. **53**, 459, 23-A1 (1983) (Abstr. in **272**, 787, 110-C12)

**Radio Sources: General**

- Accurate Formula for the Self-Compton X-Ray Flux Density from a Uniform, Spherical, Compact Radio Source. Alan P. Marscher. **264**, 296, 4-B1 (1983)
- What Is 4C 21.53? W. C. Erickson. **264**, L13, 5-A13 (1983)
- H0323+022: A Puzzling High-Latitude X-Ray/Optical/Radio Source. R. Doxsey, H. Bradt, J. McClintock, L. Petro, R. Remillard, G. Ricker, D. Schwartz, and K. Wood. **264**, L43, 11-A14 (1983)
- Radio Frequency Observations of Galactic X-Ray Sources. B. J. Geldzahler. **264**, L49, 11-B6 (1983)
- Optical and Radio Structure of the Quasar PKS 0812+02. S. Wyckoff, K. Johnston, F. Ghigo, L. Rudnick, P. Wehinger, and A. Boksenberg. **265**, 43, 12-E4 (1983)
- A Bisymmetric Spiral Magnetic Field and the Spiral Arms in Our Galaxy. Y. Sofue and M. Fujimoto. **265**, 722, 20-E12 (1983)
- Radio Pulsar Disk Electrodynamics. F. Curtis Michel. **266**, 188, 29-A9 (1983)
- Extragalactic 1 Millimeter Sources: Simultaneous Observations of Centimeter, Millimeter, and Visual Wavelengths. R. Landau, T. W. Jones, E. E. Epstein, G. Neugebauer, B. T. Soifer, M. W. Werner, J. J. Puschell, and T. J. Balonek. **268**, 68, 52-F3 (1983)
- VLA Observations of Massive Star Formation in Spiral Nuclei. J. L. Turner and P. T. Ho. **268**, L79, 63-E10 (1983)
- G29.7-0.3: Another Supernova Remnant with an Identity Crisis. R. H. Becker, D. J. Helfand, and A. E. Szymkowiak. **268**, L93, 63-F9 (1983)
- A Statistical VLB I Study of Milli-Arcsecond Cores in Extra-

- galactic Radio Sources. Robert A. Preston, David D. Morabito, and David L. Jauncey. **269**, 387, 70-F8 (1983)
- On the Microwave Emission from Comets: Erratum. D. M. Gibson and R. W. Hobbs. **269**, 805, 75-C4 (1983) (Orig. paper in **248**, 863, 91-A1)
- An Upper Limit to the Microwave Continuum Radiation from Comet Austin (1982g). L. E. Snyder, Patrick Palmer, and C. M. Wade. **269**, L21, 69-B6 (1983)
- Optical Candidates for the 1978 November 19 Gamma-Ray Burst Source. H. Pedersen, C. Motch, M. Tarengi, J. Danziger, G. Pizzichini, and W. H. G. Lewin. **270**, L43, 87-A14 (1983)
- VLBI Observations of the Radio Sources 0552+398 and 1848+283: Measurements of the Departure from Equipartition. Steven R. Spangler, Robert L. Mutel, and John M. Benson. **271**, 44, 88-D7 (1983)
- Radio Observations of Steep-Spectrum Compact Sources. W. D. Cotton. **271**, 51, 88-D14 (1983)
- A Search for the Sunyaev-Zel'dovich Effect at Millimeter Wavelengths. S. S. Meyer, A. D. Jeffries, and R. Weiss. **271**, L1, 93-A2 (1983)
- Determination of the Properties of Magnetic Turbulence in Radio Sources. Steven R. Spangler. **271**, L49, 100-A8 (1983)
- G296.05-0.50—A Large-Diameter Supernova Remnant. J. L. Caswell and Peter J. Barnes. **271**, L55, 100-A13 (1983)
- On the Radio Pulse Emission Mechanism of PSR 1133+16: Simultaneous Dual-Frequency High Time Resolution Observations. Valentin Boriakoff. **272**, 687, 109-C7 (1983)
- The Radio Structure of 3C 279. Imke de Pater and Richard A. Perley. **273**, 64, 112-G2 (1983)
- 5 GHz Observations of Sources in the Arecibo 611 MHz Survey. C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke. **51**, 67, 2-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- Supernova Remnants in the Magellanic Clouds. D. S. Mathewson, V. L. Ford, M. A. Dopita, I. R. Tuohy, K. S. Long, and David J. Helfand. **51**, 345, 7-F1 (1983) (Abstr. in **266**, 902, 38-B11)
- 5 GHz Observations of Sources in the Arecibo 611 MHz Survey: Erratum. C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke. **52**, 182, 11-G4 (1983) (Orig. paper in **51**, 67, 2-A1)

**Radio Sources: Identifications**

- The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. R. E. Griffiths, S. S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin. **269**, 375, 70-E2 (1983)
- The Probable Association of SN 1957d in NGC 5236 (M83) with an Unresolved Radio Source. Robert L. Pennington and Reginald J. Dufour. **270**, L7, 81-A8 (1983)
- 5 GHz Observations of Sources in the Arecibo 611 MHz Survey. C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke. **51**, 67, 2-A1 (1983) (Abstr. in **263**, 1005, 142-F6)
- 5 GHz Observations of Sources in the Arecibo 611 MHz Survey: Erratum. C. R. Lawrence, C. L. Bennett, J. A. Garcia-Barreto, P. E. Greenfield, and B. F. Burke. **52**, 182, 11-G4 (1983) (Orig. paper in **51**, 67, 2-A1)

**Radio Sources: Lines**

- Laboratory and Astronomical Measurement of the Millimeter Wave Spectrum of the Ethynyl Radical CCH. C. A. Gottlieb, E. W. Gottlieb, and P. Thaddeus. **264**, 740, 10-D4 (1983)
- CN in Dark Clouds. Ed Churchwell and John H. Bieging. **265**, 216, 14-D14 (1983)
- The Galactic Gradient in Electron Temperature from Observations of Low-Density H II Regions. Guido Garay and Luis F. Rodríguez. **266**, 263, 29-G1 (1983)



- Polarization of Interstellar Radio-Frequency Lines and Magnetic Field Direction. *Nikolaos D. Kylafis*. **267**, 137, 41-D8 (1983)
- Stellar Winds and Molecular Clouds: T Tauri Stars. *Nuria Calvet, Jorge Cantó, and L. F. Rodríguez*. **268**, 739, 61-C3 (1983)
- Neutral Hydrogen Absorption in the Quasar 3C 268.4: Possible Evidence for Galactic Halo Clouds. *Aubrey D. Haschick, Patrick C. Crane, and Willem A. Baan*. **269**, L43, 76-B3 (1983)
- Detection of  $\text{CH}_3\text{OH } J = 5 \rightarrow 4$  Lines around 242 GHz from OMC-1. *W. Boland, Th. de Graauw, S. Lindholm, and T. J. Lee*. **271**, 183, 90-A4 (1983)
- First Detection of the Ground-State  $J_K = 1_0 \rightarrow 0_0$  Submillimeter Transition of Interstellar Ammonia. *Jocelyn Keene, Geoffrey A. Blake, and T. G. Phillips*. **271**, L27, 93-B13 (1983)
- The Detection of Vinyl Cyanide in TMC-1. *Henry E. Matthews and Trevor J. Sears*. **272**, 149, 102-F2 (1983)
- Polarization of Interstellar Molecular Radiofrequency Absorption Lines. *Nikolaos D. Kylafis and Paul R. Shapiro*. **272**, L35, 105-F12 (1983)
- Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wooten, C. Masson, and M. A. Frerking*. **273**, 633, 120-D13 (1983)
- Linear Polarization of Interstellar Radio-Frequency Absorption Lines and Magnetic Field Direction. *Nikolaos D. Kylafis*. **275**, 135, 138-E4 (1983)
- A Search for  $^2\text{H}$ ,  $N=1$ ,  $J=3/2$  Lambda-Doubling Transitions of  $\text{CH}$ . *L. M. Ziurys, C. Henkel, and R. J. Saykally*. **275**, 175, 139-A4 (1983)
- The Distribution of the  $\text{CO } J = 2-1$  Emission from M82. *E. C. Sutton, C. R. Masson, and T. G. Phillips*. **275**, L49, 148-C2 (1983)
- Radio Recombination Lines from Quasars. I. Level Populations of Hydrogenic Ions in a Strong, Nonthermal Radiation Field. *E. James Wadiak, Craig L. Sarazin, and Robert L. Brown*. **53**, 351, 21-E3 (1983) (Abstr. in **272**, 785, 110-C10)
- Radio Sources: Spectra**
- Neutral Hydrogen Absorption in the Quasar 3C 268.4: Possible Evidence for Galactic Halo Clouds. *Aubrey D. Haschick, Patrick C. Crane, and Willem A. Baan*. **269**, L43, 76-B3 (1983)
- Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck*. **271**, L31, 93-C3 (1983)
- The Inner Radio Structure of Centaurus A: Clues to the Origin of the Jet X-Ray Emission. *Jack O. Burns, Eric D. Feigelson, and Ethan J. Schreier*. **273**, 128, 113-E6 (1983)
- The Most Luminous Quasar: S5 0014+81. *Helmut Kühr, James W. Liebert, Peter A. Strittmatter, Gary D. Schmidt, and Craig Mackay*. **275**, L33, 148-B1 (1983)
- Radio Sources: 21 cm Radiation**
- Observational Constraints on Galaxy-IGM Interactions in the Virgo Cluster. *John R. Stauffer*. **264**, 14, 1-B5 (1983)
- 21 Centimeter H I Absorption at  $z = 0.437$  against the Extended Radio Structure of 3C 196. *Robert L. Brown and Kenneth J. Mitchell*. **264**, 87, 1-G7 (1983)
- The Relation between Magnetic Field and Gas Density in Interstellar Clouds. *Robert L. Brown and Chong-An Chang*. **264**, 134, 2-D2 (1983)
- Gravitationally Induced Spurs in Spiral Galaxies: An Example in M31. *Gene G. Byrd*. **264**, 464, 7-D4 (1983)
- Molecular Self-Shielding in the Outflows from Late-Type Stars. *M. Morris and M. Jura*. **264**, 546, 8-C5 (1983)
- The H I Absorption in NGC 5128 (Centaurus A). *J. M. van der Hulst, W. F. Golisch, and A. D. Haschick*. **264**, L37, 11-A9 (1983)
- A Distance Scale from the Infrared Magnitude/H I Velocity-Width Relation. IV. The Morphological Type Dependence and Scatter in the Relation; the Distances to Nearby Groups. *Marc Aaronson and Jeremy Mould*. **265**, 1, 12-A6 (1983)
- The H I Distribution in an Extremely Faint Dwarf Irregular Galaxy M81 dwA. *W. L. W. Sargent, R. Sancisi, and K. Y. Lo*. **265**, 711, 20-D14 (1983)
- The H I Content of Envelopes around Evolved Stars. *G. R. Knapp and P. F. Bowers*. **266**, 701, 36-A5 (1983)
- Effects of Environment on Neutral Hydrogen Distribution for Disk Galaxies in the Virgo Cluster Area. *C. Giovanardi, George Helou, E. E. Salpeter, and Nathan Krumm*. **267**, 35, 40-C13 (1983)
- Neutral Hydrogen in X-Ray Cluster Galaxies: A1367. *Guido L. Chincarini, R. Giovanelli, M. Haynes, and P. Fontanelli*. **267**, 511, 46-D9 (1983)
- H I Observations of the High-Velocity System in NGC 1275. *J. H. van Gorkom and R. D. Ekers*. **267**, 528, 46-E12 (1983)
- Detection of 21 Centimeter Absorption at  $Z \approx 1.94$  in the QSO PKS 1157+014: Erratum. *A. M. Wolfe, F. H. Briggs, and D. L. Jauncey*. **267**, 891, 50-D13 (1983) (Orig. paper in **248**, 460, 86-F1)
- H I Absorption in the Peculiar Galaxy NGC 6081. *Gregory D. Bothun and Robert A. Schommer*. **267**, L15, 45-C5 (1983)
- Redshift Quantization in Compact Groups of Galaxies. *W. J. Cocke and W. G. Tifft*. **268**, 56, 52-E5 (1983)
- The Incidence of 21 Centimeter Absorption in QSO Redshift Systems Selected for Mg II Absorption: Evidence for a Two-Phase Nature of the Absorbing Gas. *F. H. Briggs and A. M. Wolfe*. **268**, 76, 52-F11 (1983)
- An Energetic, Bisymmetrically Expanding H I Remnant. *Felix J. Lockman and B. L. Ganzel*. **268**, 117, 53-B11 (1983)
- Warm H I Halos around Molecular Clouds. *Peter G. Wannier, Stephen M. Lichten, and Mark Morris*. **268**, 727, 61-B5 (1983)
- 21 Centimeter Observations of Supercluster Galaxies: The Bridge between Coma and A1367. *Guido L. Chincarini, Riccardo Giovanelli, and Martha P. Haynes*. **269**, 13, 65-B4 (1983)
- CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. *Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville*. **269**, 136, 66-E5 (1983)
- A Multifrequency Study of Star Formation in the Blue Compact Dwarf Galaxy I Zw 36. *F. Viallefond and Trinh X. Thuan*. **269**, 444, 71-C11 (1983)
- Neutral Hydrogen Absorption in the Quasar 3C 268.4: Possible Evidence for Galactic Halo Clouds. *Aubrey D. Haschick, Patrick C. Crane, and Willem A. Baan*. **269**, L43, 76-B3 (1983)
- Neutral Hydrogen Absorption in Early Spiral Galaxies. *I. F. Mirabel*. **270**, L35, 87-A7 (1983)
- Interpretation of Neutral Hydrogen Spin Temperature Measurements. *H. E. Payne, E. E. Salpeter, and Yervant Terzian*. **272**, 540, 107-F9 (1983)
- Discovery of a Large Intergalactic H I Cloud in the M96 Group. *Stephen E. Schneider, George Helou, Edwin E. Salpeter, and Yervant Terzian*. **273**, L1, 117-B2 (1983)
- A New Distance to Cygnus X-3. *John M. Dickey*. **273**, L71, 123-B8 (1983)
- Test of a Class of Models for the Variable Absorption Lines in AO 0235+164. *F. H. Briggs*. **274**, 86, 124-G8 (1983)
- Gamma-Rays from Atomic and Molecular Gas in the First Galactic Quadrant. *F. Lebrun, K. Bennett, G. F. Bignami, J. B. G. M. Bloemen, R. Buccheri, P. A. Caraveo, M. Gotwald, W. Hermsen, G. Kanbach, H. A. Mayer-Hasselwander, T. Montmerle, J. A. Paul, B. Sacco, A. W. Strong, and R. D. Wills*. **274**, 231, 126-C13 (1983)
- Radio and Optical Observations of the Alleged Optical Jet in DA 240. *Wil van Breugel, Timothy Heckman, Alan Bridle, Harvey Butcher, Richard Strom, and Bruce Balick*. **275**, 61, 137-E11 (1983)

**Radio Sources: 21 cm Radiation—Continued**

- H I Clouds, H I Spin Temperatures. *Harvey S. Liszt*. **275**, 163, 138-G6 (1983)
- Neutral Hydrogen in Isolated Galaxies. III. The Redshift Distribution. *Martha P. Haynes and Riccardo Giovanelli*. **275**, 472, 142-F3 (1983)
- VLA Observations of the Neutral Hydrogen Content of NGC 185 and NGC 205. *Douglas W. Johnson and S. T. Gottesman*. **275**, 549, 143-D14 (1983)
- A 21 Centimeter Line Survey of a Complete Sample of Interacting and Isolated Galaxies. *Lindsey Elspeth Davis and E. R. Seaquist*. **53**, 269, 20-C2 (1983) (Abstr. in **272**, 785, 110-C10)
- A Survey of H I Absorption at Low Latitudes. *John M. Dickey, Shrinivas R. Kulkarni, J. H. van Gorkom, and Carl E. Heiles*. **53**, 591, 24-G11 (1983) (Abstr. in **273**, 840, 122-F10)

**Radio Sources: Variable**

- Low Frequency Asymptotic Spectra of Multiple, Decelerating Adiabatic Bursts. *Peter D. Usher, Ke-Liang Huang, Kenneth J. Mitchell, and Joseph T. Pollock*. **264**, 451, 7-C2 (1983)
- The Arc Second Radio Structure of 12 BL Lacertae Objects. *J. S. Ulvestad, K. J. Johnston, and K. W. Weiler*. **266**, 18, 27-B9 (1983)
- Opacity Effects at Radio Wavelengths in the Quasar 1308+326. *C. P. O'Dea, W. A. Dent, and T. J. Balonek*. **266**, L1, 32-A2 (1983)
- Millimeter-Wavelength Outbursts in the Elliptical Galaxy NGC 1052. *D. S. Heeschen and J. J. Puschell*. **267**, L11, 45-C1 (1983)
- A Variable Radio Source in the Clumpy Irregular Galaxy Markarian 297. *D. S. Heeschen, J. Heidmann, and Q. F. Yin*. **267**, L73, 51-A7 (1983)
- VLA Observations of the Luminous Supernova Remnant in NGC 4449. *R. C. Bignell and E. R. Seaquist*. **270**, 140, 78-D10 (1983)
- Superluminal Motion in the Quasar 3C 345. *S. C. Unwin, M. H. Cohen, T. J. Pearson, G. A. Seielstad, R. S. Simon, R. P. Linfield, and R. C. Walker*. **271**, 536, 95-C13 (1983)
- Bright, Rapid, Highly Polarized Radio Spikes from the M Dwarf AD Leonis. *Kenneth R. Lang, Jay Bookbinder, Leon Golub, and Michael M. Davis*. **272**, L15, 105-E8 (1983)
- The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35 c$ . *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming*. **273**, L65, 123-B3 (1983)
- A New Distance to Cygnus X-3. *John M. Dickey*. **273**, L71, 123-B8 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. *Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fantl, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski*. **274**, 62, 124-E11 (1983)
- Multifrequency Observations of the Flaring Quasar 1156+295. *A. E. Glassgold, J. N. Bregman, P. J. Huggins, A. L. Kinney, A. J. Pica, J. T. Pollock, R. J. Leacock, A. G. Smith, J. R. Webb, W. Z. Wisniewski, N. Jeske, H. Spinrad, R. B. C. Henry, J. S. Miller, C. Impey, G. Neugebauer, M. F. Aller, H. D. Aller, P. E. Hodge, T. J. Balonek, W. A. Dent, and C. P. O'Dea*. **274**, 101, 125-A9 (1983)
- Dramatic Variations in the Polarization of BL Lacertae: Shocks and Gas? *Hugh D. Aller, Phillip E. Hodge, and Margo F. Aller*. **274**, L19, 129-B3 (1983)

**Relativity**

- Relativistic Tidal Forces. *Kenneth Nordvedt*. **264**, 620, 9-B2 (1983)
- The Motion of Short-Wavelength Photons in Gravitating, Refractive Media. *Thomas W. Noonan*. **264**, 627, 9-B9 (1983)
- The Optical Scalar Equations in the Presence of a Refractive Medium. *Thomas W. Noonan*. **265**, 451, 17-A5 (1983)
- Large-Amplitude Hydromagnetic Waves in Collisionless Relativistic Plasma: Exact Solution for the Fast-Mode Magnetoacoustic Wave. *Aaron Barnes*. **265**, 457, 17-A11 (1983)
- An Upper Limit on the Stochastic Background of Ultralow-Frequency Gravitational Waves. *R. W. Romani and J. H. Taylor*. **265**, L35, 26-A4 (1983)
- Comments on the Dynamical Effects of Radiative Viscosity. *Dimitri Mihalas*. **266**, 242, 29-E7 (1983)
- Flux-Limited Diffusion with Relativistic Corrections. *G. C. Pomraning*. **266**, 841, 37-E4 (1983)
- On the Stability of Rotating Stellar Models in General Relativity Theory. *Lee Lindblom and William A. Hiscock*. **267**, 384, 44-A10 (1983)
- First-Order Fermi Acceleration in Solar Flares as a Mechanism for the Second-Step Acceleration of Prompt Protons and Relativistic Electrons. *T. Bai, H. S. Hudson, R. M. Pelling, R. P. Lin, R. A. Schwartz, and T. T. von Rosenvinge*. **267**, 433, 44-E3 (1983)
- Cosmological Self-similar Shock Waves and Galaxy Formation. *E. Bertschinger*. **268**, 17, 52-B8 (1983)
- Numerical Solutions of High-Frequency Perturbations in Bianchi Type IX Models. *R. J. Slagter*. **268**, 513, 58-E13 (1983)
- A Note on the Formation of Clusters of Galaxies. *Paul S. Wesson*. **268**, 561, 59-B11 (1983)
- Relativistic Thermal Plasmas: Effects of Magnetic Fields. *Suguru Araki and Alan P. Lightman*. **269**, 49, 65-E2 (1983)
- Pressure Collimation of Supersonic Radio Jets. *Arno Krautter, R. N. Henriksen, and Kayll Lake*. **269**, 81, 65-G6 (1983)
- Image Distortion by Gravitational Lensing. *Thomas W. Noonan*. **270**, 245, 79-E10 (1983)
- The Thermal Pair Annihilation Spectrum: A Detailed Balance Approach. *Roland Svensson*. **270**, 300, 80-B11 (1983)
- The Caustics of Gravitational "Lenses". *Hans C. Ohanian*. **271**, 551, 95-D14 (1983)
- Structure of Neutron Star Envelopes. *E. H. Gudmundsson, C. J. Pethick, and R. I. Epstein*. **272**, 286, 104-B2 (1983)
- The Collisionless Damping of Density Fluctuations in an Expanding Universe. *J. R. Bond and A. S. Szalay*. **274**, 443, 130-A5 (1983)
- Hot Spots on Neutron Stars: The Near-Field Gravitational Lens. *K. R. Pechenick, C. Fiacas, and J. M. Cohen*. **274**, 846, 134-E8 (1983)
- Tidal Gravitational Radiation from Homogeneous Stars. *Clifford M. Will*. **274**, 858, 134-F6 (1983)
- Large-Amplitude Spherically Symmetric Perturbations in the Early Universe. I. The Initial Data. *Cornel Duncan*. **275**, 35, 137-C13 (1983)
- Equilibrium Configurations of Neutron Stars and the Parametrized Post-Newtonian Metric Theories of Gravitation. *Ignazio Ciufolini and Remo Ruffini*. **275**, 867, 147-A10 (1983)

**Rotation**

- Cosmic Turbulence and the Angular Momenta of Astronomical Systems: Erratum. *Robert C. Fleck, Jr.* **267**, 891, 50-D13 (1983) (Orig. paper in **261**, 631, 118-E11)
- The Equilibria of Rotating, Isothermal Clouds. I. Method of Solution. *Steven W. Stahler*. **268**, 155, 53-F5 (1983)
- The Equilibria of Rotating, Isothermal Clouds. II. Structure and Dynamical Stability. *Steven W. Stahler*. **268**, 165, 53-G1 (1983)
- Level Surface Approach for Uniformly Rotating, Axisymmetric Polytropes. *G. P. Horedt*. **269**, 303, 68-D11 (1983)
- The Ellipticities of Globular Clusters and the Second Param-

eter Problem. *John Norris*. **272**, 245, 103-F3 (1983)

X-Ray Emission of Late-Type Stars. *L. Paternò and F. Zuccarello*. **275**, L1, 141-F2 (1983)

### Shock Waves

Are There Any Shock-heated Galaxies? *Gary J. Ferland and Hagai Netzer*. **264**, 105, 2-B1 (1983)

Do the W44 and W28 Molecular Clouds Show Evidence of a Shock? *L. K. DeNoyer*. **264**, 141, 2-D9 (1983)

Magnetohydrodynamic Shock Waves in Molecular Clouds. *B. T. Draine, W. G. Roberge, and A. Dalgarno*. **264**, 485, 7-E11 (1983)

Pulsational Mode-Typing in Line Profile Variables. V. Multi-modes and "Moving Shells" in  $\nu$  Eridani and Other  $\beta$  Cephei Stars. *Myron A. Smith*. **265**, 338, 15-G2 (1983)

Another Self-similar Blast Wave: Early Time Asymptote with Shock-heated Electrons and High Thermal Conductivity. *Donald P. Cox and Richard J. Edgar*. **265**, 443, 16-G11 (1983)

The Structure and Expansion Law of a Shock Wave in an Expanding Universe. *Satoru Ikeuchi, Kohji Tomisaka, and Jeremiah P. Ostriker*. **265**, 583, 19-A5 (1983)

Observations of the 145.5 Micron [O I] Emission Line in the Orion Nebula. *Gordon J. Stacey, Scott D. Smyers, Noel T. Kurtz, and Martin Harwit*. **265**, L7, 18-E5 (1983)

The Reconfinement of Jets. *Robert H. Sanders*. **266**, 73, 27-F8 (1983)

The Mass of Tycho's Supernova Remnant as Determined from a High-Resolution X-Ray Map. *F. Seward, P. Gorenstein, and W. Tucker*. **266**, 287, 30-A14 (1983)

The Heating of Postflare Loops. *P. J. Cargill and E. R. Priest*. **266**, 383, 31-B1 (1983)

Effects of a Shock on the Molecular Composition of a Diffuse Interstellar Cloud. *George F. Mitchell and Terry J. Deveau*. **266**, 646, 35-C12 (1983)

The Nature of the Ionizing Source of the Nuclear Gas in NGC 1052. *William C. Keel and Joseph C. Miller*. **266**, L89, 39-B4 (1983)

One-dimensional Periodic Flows with a Shock Transition: Application to the Density Wave Theory of Spiral Structure. *T. J. Bogdan*. **267**, 109, 41-B8 (1983)

Shock Formation of HCO<sup>+</sup>. *Moshe Elitzur*. **267**, 174, 41-G4 (1983)

Solar Type II Radio Emission and the Shock Drift Acceleration of Electrons. *Gordon D. Holman and M. E. Pesses*. **267**, 837, 50-A1 (1983)

Cosmological Self-similar Shock Waves and Galaxy Formation. *E. Bertschinger*. **268**, 17, 52-B8 (1983)

Extended Soft X-Ray Emission from NGC 4151. *Martin Elvis, Ulrich G. Briel, and J. Patrick Henry*. **268**, 105, 53-A13 (1983)

A Coronal Transient Associated with a High-Speed Type II Burst. *T. E. Gergely, M. R. Kundu, and E. Hildner*. **268**, 403, 56-C6 (1983)

HH 1 and HH 2: The Results of an Eruptive Event in the Cohen-Schwartz Star? *Reinhard Mundt and Lee Hartmann*. **268**, 766, 61-E2 (1983)

Velocity Dispersions of Knots in Vela X and Puppis A. *Peter Shull, Jr.* **269**, 218, 67-E5 (1983)

Radio Continuum Observations of the Bar of NGC 1097. *Marc P. Ondrechen and J. M. van der Hulst*. **269**, L47, 76-B7 (1983)

First Order and Second Order Fermi Acceleration of Energetic Charged Particles by Shock Waves. *G. M. Webb*. **270**, 319, 80-D2 (1983)

Hydromagnetic Wave Dissipation in Molecular Clouds. *Ellen G. Zweibel and Karl Josaftasson*. **270**, 511, 83-F12 (1983)

Magnetic Bubbles and High-Velocity Outflows in Molecular Clouds. *B. T. Draine*. **270**, 519, 82-G6 (1983)

On the Drift Mechanism for Energetic Charged Particles at Shocks. *G. M. Webb, W. I. Axford, and T. Terasawa*. **270**, 537, 84-A10 (1983)

Self-similar Solutions for the Interaction Regions of Colliding Winds. *Roger A. Chevalier and James N. Imamura*. **270**, 554, 84-B13 (1983)

The Effect of Trapped Lepton Number and Entropy on the Outcome of Stellar Collapse. *Adam Burrows and James M. Lattimer*. **270**, 735, 86-B3 (1983)

The Spatial Distribution of Shocked Gas in the Orion Nebula. *S. C. Beck and S. Beckwith*. **271**, 175, 89-G9 (1983)

Star Formation within OB Subgroups: Implosion by Multiple Sources. *Richard I. Klein, Maxwell T. Sandford II, and Rodney W. Whitaker*. **271**, L69, 100-B12 (1983)

Implications of HEAO 3 Data for the Acceleration and Propagation of Galactic Cosmic Rays. *J. F. Ormes and R. J. Protheroe*. **272**, 756, 110-A8 (1983)

Blast Waves with Cosmic-Ray Pressure. *Roger A. Chevalier*. **272**, 765, 110-B3 (1983)

Digital Analysis of Narrow-Band Imagery of the Cygnus Loop. *J. Jeff Hester, Robert A. R. Parker, and Reginald J. Dufour*. **273**, 219, 114-E10 (1983)

The Dynamic and Gravitational Instabilities of Spherical Shocks. *Ethan T. Vishniac*. **274**, 152, 125-E4 (1983)

The Circumstellar Envelopes and Chromospheres of Cool Giants and Supergiants. *Wendy Hagen, Robert E. Stencel, and Dale F. Dickinson*. **274**, 286, 127-A1 (1983)

The Effect of a Coronal Shock Wave on the Solar Wind Ionization State. *S. P. Owocki and A. J. Hundhausen*. **274**, 414, 128-C3 (1983)

The Kinematics and Structure of N63A and Associated H II Regions. *Peter Shull, Jr.* **275**, 592, 144-A9 (1983)

The Kinematics and Structure of N49. *Peter Shull, Jr.* **275**, 611, 144-C2 (1983)

The Structure and Emission Spectrum of a Nonradiative Shock Wave in the Cygnus Loop. *J. C. Raymond, W. P. Blair, R. A. Fesen, and T. R. Gull*. **275**, 636, 144-E3 (1983)

Shock Processing of Interstellar Grains. *C. Gregory Seab and J. Michael Shull*. **275**, 652, 144-F5 (1983)

### Sky Photographs

Deep [O III] Interference Filter Imagery of the Supernova Remnants G65.3+5.7, G126.2+1.2, CTA 1, and VRO 42.05.01. *Robert A. Fesen and Theodore R. Gull*. **51**, 337, 7-D1 (1983) (Abstr. in **266**, 902, 38-B11)

The S201 Far-Ultraviolet Imaging Survey. I. Two Fields at High Galactic Latitude. *George R. Carruthers and Thornton Page*. **53**, 623, 25-C1 (1983) (Abstr. in **273**, 841, 122-F11)

### Solar System: General

Extinct Radioactivities: A Three-Phase Mixing Model. *Donald D. Clayton*. **268**, 381, 56-A12 (1983)

An Upper Limit to the Microwave Continuum Radiation from Comet Austin (1982g). *L. E. Snyder, Patrick Palmer, and C. M. Wade*. **269**, L21, 69-B6 (1983)

Discovery of s-Process Nd in Allende Residue. *Donald D. Clayton*. **271**, L107, 100-E3 (1983)

### Spectrophotometry

A Photometric Survey of Compact and Selected Planetary Nebulae. *James B. Kaler*. **264**, 594, 8-F13 (1983)

Infrared/Optical Energy Distributions of High-Redshift Quasars. *B. T. Soifer, G. Neugebauer, J. B. Oke, K. Matthews, and J. H. Lacy*. **265**, 18, 12-B12 (1983)

Spectrophotometry of the Broad Absorption-Line QSO PHL 5200. *Vesa T. Junkkarinen, E. Margaret Burbidge, and Harding E. Smith*. **265**, 51, 12-E13 (1983)

IUE Observations of Markarian 3 and 6: Reddening and the Nonstellar Continuum. *Matthew A. Malkan and J. B. Oke*. **265**, 92, 13-B1 (1983)

The Albedo of Uranus. *G. W. Lockwood, B. L. Lutz, D. T. Thompson, and A. Warnock III*. **266**, 402, 31-C6 (1983)

Two-Dimensional Photometry of Planetary Nebulae. *Peter N. Kupferman*. **266**, 689, 35-F13 (1983)

Secondary Standard Stars for Absolute Spectrophotometry.

**Spectrophotometry—Continued**

- J. B. Oke and J. E. Gunn. **266**, 713, 36-B4 (1983)
- The Angular Diameters, Effective Temperatures, Radii, and Luminosities of 10 Wolf-Rayet Stars. Anne B. Underhill. **266**, 718, 36-B10 (1983)
- Spectrophotometry of B, A, and F Stars. III. Saul J. Adelman and Diane M. Pyper. **266**, 732, 36-C10 (1983)
- Spectral Energy Distributions of Young Stellar Objects. I. A Turbospheric Model for DR Tauri. Roger K. Ulrich, Allen W. Shafter, George Hawkins, and Gillian Knapp. **267**, 199, 42-B2 (1983)
- Reddening Indicators for Quasars and Seyfert I Galaxies. Steven A. Grandi. **268**, 591, 59-D13 (1983)
- Spectroscopic Analysis of Dwarf and Subgiant Stars in 47 Tucanae. R. A. Bell, James E. Hesser, and R. D. Cannon. **269**, 580, 72-F13 (1983)
- Near-Infrared Spectrophotometry of Planetary Nebulae. P. D. LeVan and Richard J. Rudy. **272**, 137, 102-E4 (1983)
- Spectrophotometry of 12 Metal-poor Galaxies: Implications for the Primordial Helium Abundance. Daniel Kunth and Wallace L. W. Sargent. **273**, 81, 113-A7 (1983)
- Digital Analysis of Narrow-Band Imagery of the Cygnus Loop. J. Jeff Hester, Robert A. R. Parker, and Reginald J. Dufour. **273**, 219, 114-E10 (1983)
- Spectra of Seyfert Galaxies and Seyfert Galaxy Candidates. Donald E. Osterbrock and Oved Dahari. **273**, 478, 118-F14 (1983)
- The QSO 1156+295: A Multifrequency Study of Recent Activity. Beverley J. Wills, J. T. Pollock, H. D. Aller, M. F. Aller, T. J. Balonek, R. E. Barvainis, R. P. Binzel, F. H. Chaffee, Jr., W. A. Dent, J. N. Douglas, C. Fantii, D. B. Garrett, L. Gregorini, Richard B. C. Henry, R. E. Hill, R. Howard, N. Jeske, S. O. Kepler, R. J. Leacock, F. Mantovani, C. P. O'Dea, L. Padrielli, P. Perley, A. J. Pica, J. J. Puschell, N. Sanduleak, G. A. Shields, A. G. Smith, T. X. Thuan, C. M. Wade, A. J. Wasilewski, J. R. Webb, D. Wills, and W. Z. Wisniewski. **274**, 62, 124-E11 (1983)
- LHS 2924: A Uniquely Cool Low-Luminosity Star with a Peculiar Energy Distribution. Ronald G. Probst and James Liebert. **274**, 245, 126-D13 (1983)
- Spectrophotometry of M33 Clusters. C. A. Christian and R. A. Schommer. **275**, 92, 138-A11 (1983)
- The Stellar and Nonstellar Continua of Seyfert Galaxies: Non-thermal Emission in the Near-Infrared. Matthew A. Malkan and Alexei V. Filippenko. **275**, 477, 142-F8 (1983)
- Stellar Spectrophotometric Atlas, 3130- $\lambda$ <10800 Å. James E. Gunn and L. L. Stryker. **52**, 121, 11-A11 (1983) (Abstr. in **268**, 906, 63-A9)
- An H $\alpha$  [N II] Survey of the Nuclei of a Complete Sample of Spiral Galaxies. William Keel. **52**, 229, 12-F8 (1983) (Abstr. in **269**, 810, 75-C9)
- Spectroscopy of Cataclysmic Variables. I. Observations. Glen Williams. **53**, 523, 24-A2 (1983) (Abstr. in **273**, 839, 122-F9)
- Spectrophotometric Observations of Symbiotic Stars and Related Objects. William P. Blair, Robert E. Stencel, Walter A. Feibelman, and Andrew G. Michalitsianos. **53**, 573, 24-F7 (1983) (Abstr. in **273**, 839, 122-F9)
- Scanner Observations of Field Horizontal-Branch A Stars. A. G. Davis Philip and D. S. Hayes. **53**, 751, 27-A2 (1983) (Abstr. in **274**, 920, 135-E1)
- Multichannel Spectrometer Observations of Globular Cluster Horizontal-Branch A Stars. D. S. Hayes and A. G. Davis Philip. **53**, 759, 27-A10 (1983) (Abstr. in **274**, 921, 135-E2)
- Spiral Structure: see Galaxies: Structure**
- SS Cygni Stars: see U Geminorum**
- Stars: Abundances**
- The Ages and Compositions of Old Clusters. Kenneth Janes and Pierre Demarque. **264**, 206, 3-B6 (1983)
- The Cyanogen Distribution of the Red Giants in M5. Graeme H. Smith and John Norris. **264**, 215, 3-C1 (1983)
- Evolutionary Effects of Helium Diffusion in Population II Stars. Guy S. Stringfellow, Peter Bodenheimer, Peter D. Noerdlinger, and Richard J. Arigo. **264**, 228, 3-C14 (1983)
- An Attempt to Determine Stellar Lyman-Alpha Emission-Line Fluxes for F Stars with Different Metal Abundances. Erika Böhm-Vitense and Jack Woods. **265**, 331, 15-F8 (1983)
- Long-Period Variables in the Galactic Bulge: Evidence for a Young Super-Metal-rich Population. P. R. Wood and M. S. Bessell. **265**, 748, 21-A1 (1983)
- Evidence of Non-LTE in Photospheric Lines of G and K Giants. Jeffery A. Brown, Jocelyn Tomkin, and David L. Lambert. **265**, L93, 26-E6 (1983)
- The Chemical Inhomogeneity of M22. John Norris and K. C. Freeman. **266**, 130, 28-D5 (1983)
- Carbon and Nitrogen Abundances in Giant Stars of the Metal-poor Globular Cluster M15. Charles F. Trefzger, Duane F. Carbon, G. E. Langer, Nicholas B. Suntzeff, and Robert P. Kraft. **266**, 144, 28-E6 (1983)
- Iron and Magnesium in the White Dwarf GD 40: A Test of Diffusion Theory. Harry L. Shipman and Jesse L. Greenstein. **266**, 761, 36-E12 (1983)
- NGC 752 and Main-Sequence Bimodality. Bruce A. Twarog. **267**, 207, 42-B10 (1983)
- Chemical Separation in Horizontal-Branch Stars. Georges Michaud, Gérard Vauclair, and Sylvie Vauclair. **267**, 256, 42-F4 (1983)
- Equilibrium Composition and Neutrino Emissivity of Interacting Quark Matter in Neutron Stars. Robert C. Duncan, Stuart L. Shapiro, and Ira Wasserman. **267**, 358, 43-F12 (1983)
- HR 7578: A K Dwarf Double-lined Spectroscopic Binary with Peculiar Abundances. Francis C. Fekel, Jr. and W. I. Beavers. **267**, 682, 48-C2 (1983)
- Barium from a Mini r-Process in Supernovae. D. Heymann. **267**, 747, 49-A1 (1983)
- The R- and s-Process Nuclei in the Early History of the Galaxy: HD 122563. Christopher Sneden and M. Parthasarathy. **267**, 757, 49-A11 (1983)
- Metal Abundances of RR Lyrae Stars in Globular Clusters: Erratum. Horace A. Smith and George J. Perkins. **267**, 891, 50-D13 (1983) (Orig. paper in **261**, 576, 118-A8)
- A Survey of Spectral Morphology and Rotational Velocities among the Helium-rich Stars. Nolan R. Walborn. **268**, 195, 54-B3 (1983)
- The Spectra of Wolf-Rayet Stars. I. Optical Line Strengths and the Hydrogen-to-Helium Ratios in WN Type Stars. Peter S. Conti, E. Mykky Leep, and Douglas N. Perry. **268**, 228, 54-D9 (1983)
- Observations of Ultraviolet Carbon Lines in the Spectra of Three DC White Dwarfs. G. Wegner. **268**, 282, 55-A9 (1983)
- Spectroscopic Analysis of Dwarf and Subgiant Stars in 47 Tucanae. R. A. Bell, James E. Hesser, and R. D. Cannon. **269**, 580, 72-F13 (1983)
- A Comparison between Observed and Theoretical H-R Diagrams for the Young LMC Star Cluster NGC 1866. Stephen A. Becker and Grant J. Mathews. **270**, 155, 78-E12 (1983)
- Stellar Populations in Local Group Dwarf Elliptical Galaxies. I. NGC 147. J. R. Mould, Jerome Kristian, and G. S. Da Costa. **270**, 471, 83-C10 (1983)
- Abundances in Globular Cluster Red Giants. V. The Metal-rich Globular Clusters. Judith G. Cohen. **270**, 654, 85-C4 (1983)
- The Chemical Inhomogeneity of the Sculptor Dwarf Spheroidal Galaxy. Graeme H. Smith and Michael A. Dopita. **271**, 113, 89-B11 (1983)
- Lithium Abundance and Age Spread in the Pleiades. Douglas K. Duncan and Burton F. Jones. **271**, 663, 96-F9 (1983)
- Nickel Overabundances in Extremely Metal-deficient Red



- Giants. *R. Earle Luck and Howard E. Bond.* **271**, L75, 100-C3 (1983)
- The Evolutionary State and Pulsation Characteristics of Red Variables in Globular Clusters. *Jay A. Frogel.* **272**, 167, 102-G6 (1983)
- Photoionization Models for the Winds from Cataclysmic Variables. *T. R. Kallman.* **272**, 238, 103-E10 (1983)
- The Ellipticities of Globular Clusters and the Second Parameter Problem. *John Norris.* **272**, 245, 103-F3 (1983)
- The Al i-Cyanogen Correlation in the Spectra of Globular Cluster Red Giants and the Origin of Intercluster Heavy Element Variations. *John Norris and Graeme H. Smith.* **272**, 635, 108-F8 (1983)
- Element Identifications in the Ultraviolet Spectrum of HD 101065. *G. Wegner, D. J. Cummins, P. B. Byrne, and D. J. Stickland.* **272**, 646, 108-G5 (1983)
- G74-7: A True DA,F (DAZ) White Dwarf. *P. Lacombe, James Liebert, F. Wesemael, and G. Fontaine.* **272**, 660, 109-A8 (1983)
- The Chemical Composition of Distant Globular Clusters: Are There Any Metal-poor Clusters? *Catherine A. Pilachowski, Gregory D. Bothun, Edward W. Olszewski, and Andrew Odell.* **273**, 187, 114-C5 (1983)
- Heavy-Element Abundances in the Classical Barium Star HR 774. *Jocelyn Tomkin and David L. Lambert.* **273**, 722, 121-D14 (1983)
- Quantitative Technetium and Niobium Abundances in Heavy-Element Stars. *Verne V. Smith and George Wallerstein.* **273**, 742, 121-F6 (1983)
- On Tidal Detonation of Stars by Massive Black Holes. *G. V. Bicknell and R. A. Gingold.* **273**, 749, 121-F13 (1983)
- The Chemical Inhomogeneity of M22: Erratum. *John Norris and K. C. Freeman.* **273**, 837, 122-F6 (1983) (Orig. paper in **266**, 130, 28-D5)
- The Resonance Lines of Aluminum in IUE Spectra of B-Type Chemically Peculiar Stars. *Kozo Sadakane, Masahide Takada, and Jun Jugaku.* **274**, 261, 126-F2 (1983)
- Metal Content of K Giants in the Nuclear Bulge of the Galaxy. *A. E. Whitford and R. M. Rich.* **274**, 723, 133-C8 (1983)
- The Age and Composition of the LMC Red Globular Cluster NGC 2121. *Phillip Flower, Douglas Geisler, Paul Hodge, Edward Olszewski, and Robert Schommer.* **275**, 15, 137-B7 (1983)
- The Cyanogen Distribution of the Giants in NGC 2808. *John Norris and Graeme H. Smith.* **275**, 120, 138-D1 (1983)
- The Cool DC White Dwarf Stein 2051B. *Gary Wegner and F. H. Yackovich.* **275**, 240, 139-F3 (1983)
- Globular Cluster Giant Branches and the Metallicity Scale. *Jay A. Frogel, Judith G. Cohen, and S. E. Persson.* **275**, 773, 146-A9 (1983)
- Carbon Star Formation and Neutron-rich Isotope Formation in Low-Mass Asymptotic Giant Branch Stars. *Icko Iben, Jr.* **275**, L65, 148-D5 (1983)
- Star Clusters and Stellar Evolution. I. Improved Synthetic Color-Magnitude Diagrams for the Oldest Clusters. *Don A. Vandenberg.* **51**, 29, 1-D1 (1983) (Abstr. in **263**, 1006, 142-F7)
- Color-Magnitude Studies of Globular Clusters. I. The Bright Stars in NGC 362: Erratum. *William E. Harris.* **51**, 269, 5-C1 (1983) (Orig. paper in **50**, 573, 31-D1)
- The Chemical Composition of Stars in Globular Clusters. *Catherine A. Pilachowski, Christopher Sneden, and George Wallerstein.* **52**, 241, 12-G9 (1983) (Abstr. in **269**, 810, 75-C9)
- Rotational Studies of Late-Type Stars. II. Ages of Solar-Type Stars and the Rotational History of the Sun. *David R. Soderblom.* **53**, 1, 17-A3 (1983) (Abstr. in **271**, 889, 99-B11)
- The Magnetic Fields of the Helium-weak B Stars. *Ermanno F. Borra, J. D. Landstreet, and Ian Thompson.* **53**, 151, 18-D13 (1983) (Abstr. in **271**, 894, 99-C2)
- Stars: Accretion**
- Four-Color Photometry of RZ Ophiuchi and Its Accretion Disk. *Edward C. Olson and Jeffrey P. Hickey.* **264**, 251, 3-E9 (1983)
- A One-Zone Model for Shell Flashes on Accreting Compact Stars. *Bohdan Paczyński.* **264**, 282, 4-A1 (1983)
- The Thermonuclear Model for X-Ray Transients: Erratum. *R. K. Wallace, S. E. Woosley, and Thomas A. Weaver.* **264**, 746, 10-D10 (1983) (Orig. paper in **258**, 696, 81-A1)
- Ultraviolet Spectroscopy of V1341 Cygni (= Cygnus X-2). *L. Chiappetti, L. Maraschi, E. G. Tanzi, and A. Treves.* **265**, 354, 16-A5 (1983)
- The Eddington Limit and Supercritical Accretion. II. Time-dependent Calculations. *H. L. Burger and J. I. Katz.* **265**, 393, 16-D3 (1983)
- Accretion onto Magnetized Neutron Stars: X-Ray Pulsars with Intermediate Rotation Rates. *David J. Burnard, Susan M. Lea, and Jonathan Arons.* **266**, 175, 28-G10 (1983)
- Radio Pulsar Disk Electrodynamics. *F. Curtis Michel.* **266**, 188, 29-A9 (1983)
- Iron and Magnesium in the White Dwarf GD 40: A Test of Diffusion Theory. *Harry L. Shipman and Jesse L. Greenstein.* **266**, 761, 36-E12 (1983)
- The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae). *G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen.* **266**, 806, 37-B10 (1983)
- CNO Abundances and the Strengths of Nova Outbursts and Hydrogen Flashes on Accreting White Dwarfs. *Jim MacDonald.* **267**, 732, 48-F14 (1983)
- High Spatial Resolution VLA Observations of the R Aquarii Jet. *M. Kafatos, J. M. Hollis, and A. G. Michalitsianos.* **267**, L103, 51-C7 (1983)
- X-Ray Spectra and Light Curves of Accreting Magnetic Degenerate Dwarfs. *James N. Imamura and Richard H. Durisen.* **268**, 291, 55-B4 (1983)
- Mass Loss, Levitation, Accretion, and the Sharp-Lined Features in Hot White Dwarfs. *Frederick C. Bruhweiler and Yoji Kondo.* **269**, 657, 73-E14 (1983)
- On the Evolutionary Status of Bright, Low-Mass X-Ray Sources. *R. F. Webbink, S. Rappaport, and G. J. Savonije.* **270**, 678, 85-E1 (1983)
- Accretion Powered X-Ray Pulsars. *N. E. White, J. H. Swank, and S. S. Holt.* **270**, 711, 85-G7 (1983)
- Compton Heated Winds and Coronae above Accretion Disks. I. Dynamics. *Mitchell C. Begelman, Christopher F. McKee, and Gregory A. Shields.* **271**, 70, 88-F9 (1983)
- Compton Heated Winds and Coronae above Accretion Disks. II. Radiative Transfer and Observable Consequences. *Mitchell C. Begelman and Christopher F. McKee.* **271**, 89, 89-A1 (1983)
- Meridional Circulation in Rotating Stars. VI. The Effects of Anisotropic Eddy Viscosity. *Monique Tassoul and Jean-Louis Tassoul.* **271**, 315, 91-D6 (1983)
- Magnetism in the AM Herculis Variable CW 1103+254. *Gary D. Schmidt, H. S. Stockman, and Steven A. Grandi.* **271**, 735, 97-E1 (1983)
- The High-Energy Spectrum of Hot Accretion Disks. *Jean A. Eilek and Minas Kafatos.* **271**, 804, 98-C5 (1983)
- The Dynamics of Dissipatively Heated Spherical Accretion. *Ernst T. Scharlemann.* **272**, 279, 104-A9 (1983)
- Viscous Drag on an Accretion Disk due to an Embedded Stellar System. *Jeremiah P. Ostriker.* **273**, 99, 113-B14 (1983)
- The Outbursts of Symbiotic Novae. *Scott J. Kenyon and James W. Truran.* **273**, 280, 115-C10 (1983)
- Mixing by Shear Instabilities in Differentially Rotating Inhomogeneous Stars with Application to Accreting White Dwarf Models for Novae. *Jim MacDonald.* **273**, 289, 115-D5 (1983)
- Collapse and Explosion of White Dwarfs. I. Precollapse Evo-

**Stars: Accretion—Continued**

- lution. *J. Isern, J. Labay, M. Hernanz, and R. Canal.* **273**, 320, 115-F8 (1983)
- On the Clock Mechanism and the Implausibility of the 35 Day Precessing Disk in HZ Herculis/Hercules X-1. *Yoji Kondo, Thomas C. Van Flandern, and Charles L. Wolff.* **273**, 716, 121-D8 (1983)
- Observations of a Hard X-Ray Component in the Spectrum of Nova Ophiuchi. *C. K. Wilson and R. E. Rothschild.* **274**, 717, 133-C2 (1983)
- Pulsations and Viscosity. *J. P. Cox and B. L. Everson.* **52**, 451, 16-D11 (1983) (Abstr. in **270**, 780, 86-E7)

**Stars: Atmospheres**

- A Giant X-Ray Flare in the Hyades. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos.* **264**, L55, 11-B11 (1983)
- The Planetary Nebula IC 3568: A Model Based on IUE Observations. *J. Patrick Harrington and Walter A. Feibelman.* **265**, 258, 15-A4 (1983)
- An Alternative Model for the Atmospheres of Wolf-Rayet and O Stars. *Anne B. Underhill.* **265**, L87, 26-E1 (1983)
- The Hot DO White Dwarf HD 149499 B: Einstein Redshift of a DB Progenitor with Carbon Features. *Edward M. Sion and Edward F. Guinan.* **265**, L87, 26-E1 (1983)
- Evidence of Non-LTE in Photospheric Lines of G and K Giants. *Jeffery A. Brown, Jocelyn Tomkin, and David L. Lambert.* **265**, L93, 26-E6 (1983)
- The Angular Diameters, Effective Temperatures, Radii, and Luminosities of 10 Wolf-Rayet Stars. *Anne B. Underhill.* **266**, 718, 36-B10 (1983)
- The R- and s-Process Nuclei in the Early History of the Galaxy: HD 122563. *Christopher Sneden and M. Purthasarathy.* **267**, 757, 49-A11 (1983)
- The Dependence of H $\alpha$  on Chromospheric Activity in G and K Main-Sequence Stars. *D. M. Zarro.* **267**, L61, 45-F6 (1983)
- H $\alpha$  Line Profiles in B Stars: Comparison of Theory and Observations. *J. N. Heasley and Sidney C. Wolff.* **269**, 634, 73-C14 (1983)
- The Detection of H $_2$  in Cool Carbon Stars. *H. R. Johnson, J. H. Goebel, D. Goorvitch, and S. T. Ridgway.* **270**, L63, 87-C9 (1983)
- Second-Order Escape Probability Approximations in Radiative Transfer: Erratum. *D. G. Hummer and George B. Rybicki.* **271**, 888, 99-B10 (1983) (Orig. paper in **263**, 925, 141-G7)
- Neutrino Emission from a Hot, Dense, Plane-parallel Atmosphere in Hydrostatic Equilibrium. III. The Three-flavored Atmosphere. *Paul J. Schinder and Stuart L. Shapiro.* **273**, 330, 115-G4 (1983)
- Model Atmospheres of Red Degenerate Stars. *Stelios Karpantidis.* **275**, 342, 140-F8 (1983)
- Alfvén Waves in Stellar Winds. *Thomas E. Holzer, Tor Flå, and Egil Leer.* **275**, 808, 146-D3 (1983)
- A Giant X-Ray Flare in the Hyades: Erratum. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos.* **275**, L25, 141-G9 (1983) (Orig. paper in **264**, L55, 11-B11)

**Stars: Ba II**

- Barium from a Mini r-Process in Supernovae. *D. Heymann.* **267**, 747, 49-A1 (1983)
- The Binary Nature of the Barium Stars. II. Velocities, Binary Frequency, and Preliminary Orbits. *Robert D. McClure.* **268**, 264, 54-G3 (1983)
- Do All Barium Stars Have a White Dwarf Companion? *James F. Dominy and David L. Lambert.* **270**, 180, 78-G11 (1983)
- Heavy-Element Abundances in the Classical Barium Star HR 774. *Jocelyn Tomkin and David L. Lambert.* **273**, 722, 121-D14 (1983)

**Stars: Be**

- The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae). *G. A.*

*Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen.* **266**, 806, 37-B10 (1983)

- X-Ray Properties of the Be/X-Ray System 2S 0114+650 = LSI + 65°010. *G. Koenigsberger, J. H. Swank, A. E. Szymkowiak, and N. E. White.* **268**, 782, 61-F4 (1983)
- Episodic Mass Loss and Narrow Lines in Gamma Cassiopeiae and in Other Early-Type Stars. *H. F. Henrichs, G. Hamerschlag-Hensberge, I. D. Howarth, and P. Barr.* **268**, 807, 62-A1 (1983)
- Discovery of 9.3 s X-Ray Pulsations from 2S 1553–542 and a Determination of the Orbit. *R. L. Kelley, S. Rappaport, and S. Ayasli.* **274**, 765, 133-F8 (1983)
- Detection of High-Order Nonradial Oscillations on the Rapid Rotator Zeta Ophiuchi and Their Line with Be Type Outbursts. *Steven S. Vogt and G. Donald Penrod.* **275**, 661, 144-F14 (1983)
- Ultraviolet Spectroscopic Observations of Some Be Stars of Later Type and A–F Type Shell Stars. *Arne Slettebak and Kenneth G. Carpenter.* **53**, 869, 28-G1 (1983) (Abstr. in **274**, 923, 135-E4)

**Stars:  $\beta$  Cephei**

- Pulsational Mode-Typing in Line Profile Variables. V. Multi-modes and “Moving Shells” in  $\nu$  Eridani and Other  $\beta$  Cephei Stars. *Myron A. Smith.* **265**, 338, 15-G2 (1983)

**Stars: Binaries**

- X Persei: Optical Polarization Variation on the 580 Day Binary-like Period. *James C. Kemp and Mark S. Barbour.* **264**, 237, 3-D9 (1983)
- Relativistic Tidal Forces. *Kenneth Nordvedt.* **264**, 620, 9-B2 (1983)
- HD 207739: A Strange Composite Star. *Sidney B. Parsons, Albert V. Holm, and Yoji Kondo.* **264**, L19, 5-B4 (1983)
- A Giant X-Ray Flare in the Hyades. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos.* **264**, L55, 11-B11 (1983)
- H2215–086: King of the DQ Hercules Stars. *Joseph Patterson and J. E. Steiner.* **264**, L61, 11-C2 (1983)
- Radial Velocities of a Random Sample of K Giant Stars and Implications Concerning Multiplicity among Giant Stars in Clusters. *Hugh C. Harris and Robert D. McClure.* **265**, L77, 26-D6 (1983)
- Conservative Mass Transfer in Close Binary Systems. I. Equations of Motion for Spin and Orbital Angular Momenta. *John J. Matese and Daniel P. Whitmire.* **266**, 776, 36-F13 (1983)
- Radial Velocity Studies of Cataclysmic Binaries. I. KR Aurigae. *Allen W. Shafter.* **267**, 222, 42-C11 (1983)
- Rapid Rotation and Stellar Activity in the Triple System HD 165590. *Robert A. Stern and Andrew Skumanich.* **267**, 232, 42-D8 (1983)
- The Effect of Sudden Mass Loss and a Random Kick Velocity Produced in a Supernova Explosion on the Dynamics of a Binary Star of Arbitrary Orbital Eccentricity. Applications to X-Ray Binaries and to the Binary Pulsars. *J. G. Hills.* **267**, 322, 43-D4 (1983)
- HR 7578: A K Dwarf Double-lined Spectroscopic Binary with Peculiar Abundances. *Francis C. Fekel, Jr. and W. I. Beavers.* **267**, 682, 48-C2 (1983)
- X-Ray Evidence for White Dwarf Binaries in Globular Clusters. *Paul Hertz and Jonathan E. Grindlay.* **267**, L83, 51-B2 (1983)
- On the Nature of Upsilon Sagittarii. *D. Schönberner and J. S. Drilling.* **268**, 225, 54-D6 (1983)
- The Binary Nature of the Barium Stars. II. Velocities, Binary Frequency, and Preliminary Orbits. *Robert D. McClure.* **268**, 264, 54-G3 (1983)
- Spectroscopy of V711 Tauri (= HR 1099): Fundamental Properties and Evidence for Starspots. *Francis C. Fekel, Jr.* **268**, 274, 55-A1 (1983)
- X-Ray Spectra and Light Curves of Accreting Magnetic De-

- generate Dwarfs. *James N. Imamura and Richard H. Durisen*. **268**, 291, 55-B4 (1983)
- Binary-Single Star Scattering. I. Numerical Experiments for Equal Masses. *Piet Hut and John N. Bahcall*. **268**, 319, 55-D6 (1983)
- Binary-Single Star Scattering. II. Analytic Approximations for High Velocity. *Piet Hut*. **268**, 342, 55-F1 (1983)
- Angular Momentum Loss and the Evolution of Cataclysmic Binaries. *Ronald E. Taam*. **268**, 361, 55-G6 (1983)
- Approximations to the Radii of Roche Lobes. *Peter P. Eggleton*. **268**, 368, 55-G13 (1983)
- Orbital Period Changes in Centaurus X-3. *R. L. Kelley, S. Rappaport, G. W. Clark, and L. D. Petro*. **268**, 790, 61-F12 (1983)
- The Minimum Period and the Gap in Periods of Cataclysmic Binaries. *Bohdan Paczyński and Ryszard Sienkiewicz*. **268**, 825, 62-B7 (1983)
- Further Observations of the Long-Period Binary Pulsar PSR 0820+02. *R. N. Manchester, Lynette M. Newton, D. J. Cooke, P. R. Backus, M. Damashek, J. H. Taylor, and J. J. Condon*. **268**, 832, 62-B14 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. *Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Batty, R. F. Haynes, Alan E. Wright, and George D. Nicolson*. **268**, L23, 57-B13 (1983)
- An X-Ray Survey of Nine Algol Systems. *N. E. White and F. E. Marshall*. **268**, L117, 64-A9 (1983)
- Rotational Studies of Late-Type Stars. III. Rotation among BY Draconis Stars. *Steven S. Vogt, David R. Soderblom, and G. Donald Penrod*. **269**, 250, 67-G11 (1983)
- The Binary Central Star of the Planetary Nebula LT-5. *Walter A. Feibelman and James B. Kaler*. **269**, 592, 72-G11 (1983)
- A Spectroscopic Study of Four Late-Type Galactic WN Stars: The Question of Duplicity. *Robert Lamontagne, Anthony F. J. Moffat, and Wilhelm Seggewiss*. **269**, 596, 73-A1 (1983)
- Narrow-Band Photometric Periods in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi*. **269**, 605, 73-A11 (1983)
- Do All Barium Stars Have a White Dwarf Companion? *James F. Dominy and David L. Lambert*. **270**, 180, 78-G11 (1983)
- On the Evolutionary Status of Bright, Low-Mass X-Ray Sources. *R. F. Webbink, S. Rappaport, and G. J. Savonije*. **270**, 678, 85-E1 (1983)
- The Evolution of a Stripped Giant-Neutron Star Binary. *Ronald E. Taam*. **270**, 694, 85-F4 (1983)
- Discovery of Eclipses in the X-Ray Source HD 155638. *Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry*. **270**, L79, 87-D8 (1983)
- The Precataclysmic Nucleus of Abell 41. *Albert D. Grauer and Howard E. Bond*. **271**, 259, 90-G5 (1983)
- Identification of CW 1103+254 as a New Magnetic Variable. *H. S. Stockman, C. B. Foltz, G. D. Schmidt, and S. Tapia*. **271**, 725, 97-D5 (1983)
- Magnetism in the AM Herculis Variable CW 1103+254. *Gary D. Schmidt, H. S. Stockman, and Steven A. Grandi*. **271**, 735, 97-E1 (1983)
- The Massive WC6+O6-8 Spectroscopic Binary HD 94305. *Virpi S. Niemela, Roberto H. Méndez, and Anthony F. J. Moffat*. **272**, 190, 103-B2 (1983)
- HD 164615: A Probable Spotted Single F Type Star. *Helmut A. Abt, Galen Bollinger, and Edward W. Burke, Jr.* **272**, 196, 103-B10 (1983)
- A New Look at BE Ursae Majoris. *D. Crampton, A. P. Cowley, and J. B. Hutchings*. **272**, 202, 103-C2 (1983)
- A Search for Light-Time Effects in Binary Cepheids: AW Persei. *Nancy Remage Evans*. **272**, 214, 103-C14 (1983)
- A Search for X-Rays from Runaway Stars. *C. Krishna Kumar, Imothy R. Kallman, and Roger J. Thomas*. **272**, 219, 103-D5 (1983)
- Outer Atmospheres of Cool Stars. XIII. Capella at Critical Phases. *Thomas R. Ayres, Francis H. Schiffer III, and Jeffrey L. Linsky*. **272**, 223, 103-D9 (1983)
- On the Nature of Dwarf Novae. *J. Smak*. **272**, 234, 103-E6 (1983)
- Binaries as a Heat Source in Stellar Dynamics: Release of Binding Energy. *Piet Hut*. **272**, L29, 105-F7 (1983)
- Radio Emission from AM Herculis: The Quiescent Component and an Outburst. *George A. Dulk, Timothy S. Bastien, and G. Channugam*. **273**, 249, 115-A7 (1983)
- Precession Instability in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi*. **273**, 697, 121-C2 (1983)
- Mass of Large Magellanic Cloud X-3. *Bohdan Paczyński*. **273**, L81, 123-C3 (1983)
- An Infrared Search for Very Low Mass Stars: The Luminosity Function. *Ronald G. Probst*. **274**, 237, 126-D5 (1983)
- Discovery of 9.3 s X-Ray Pulsations from 2S 1553-542 and a Determination of the Orbit. *R. L. Kelley, S. Rappaport, and S. Ayasli*. **274**, 765, 133-F8 (1983)
- A Comparison of Theoretical to Observed Type I Supernova Rates. *Glenn E. Miller and Roger A. Chevalier*. **274**, 840, 134-E2 (1983)
- Synchronization of Magnetic Stars in Binary Systems. *F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb*. **274**, L71, 136-B12 (1983)
- SS 433: Improved Evidence for a Persistent 160 Day Photometric Period. *Gary D. Henson, James C. Kemp, Mark S. Barbour, Daniel J. Kraus, Elia M. Leibowitz, and Tsevi Mazeh*. **275**, 247, 139-F10 (1983)
- On the Fission Theory of Binary Stars. III. The Formulation of the Bifurcation Problem. *N. R. Lebovitz*. **275**, 316, 140-D10 (1983)
- Observations of Active Chromosphere Stars. *Bernard W. Bopp, John L. Africano, R. E. Stencel, P. V. Noah, and A. Klimke*. **275**, 691, 145-B2 (1983)
- Linear Polarization Measurements of the AM Herculis Objects H0139-68 and E1405-451. *N. Visvanathan and I. Tuohy*. **275**, 709, 145-C6 (1983)
- A New Technique for Calculations of Binary Stellar Evolution, with Application to Magnetic Braking. *S. Rappaport, F. Verbunt, and P. C. Joss*. **275**, 713, 145-C10 (1983)
- Giant X-Ray Flare in the Hyades: Erratum. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos*. **275**, L25, 141-G9 (1983) (Orig. paper in **264**, L55, 11-B11)
- A Spectrographic Orbit for LMC X-1: Another Massive X-Ray Source? *J. B. Hutchings, D. Crampton, and A. P. Cowley*. **275**, L43, 148-B11 (1983)
- Optical Radiation Associated with Gamma-Ray Bursts. *Richard A. London and Lynn R. Cominsky*. **275**, L59, 148-C14 (1983)
- Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, Belva G. Campbell, and Francis C. Fekel*. **51**, 309, 6-F1 (1983) (Abstr. in **265**, 1135, 25-B11)
- General Properties of Algol Binaries. *G. Giuricin, F. Mardirrossian, and M. Mezzetti*. **52**, 35, 9-E1 (1983) (Abstr. in **267**, 892, 50-D14)
- Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, and Belva G. Campbell*. **53**, 241, 19-D4 (1983) (Orig. paper in **51**, 309, 6-F1)
- An Infrared Search for Very Low Mass Stars: JHK Photometry and Results for Composite Systems. *Ronald G. Probst*. **53**, 335, 21-D2 (1983) (Abstr. in **272**, 785, 110-C10)
- Ultraviolet and Optical Studies of Binaries with Luminous Cool Primaries and Hot Companions. III. Reticon Radial Velocities. *Sidney B. Parsons*. **53**, 553, 24-E1 (1983) (Abstr. in **273**, 839, 122-F9)

**Stars: Carbon**

- Carbon Stars in Local Group Galaxies. *Harvey B. Richer and Bengt E. Westerlund*. **264**, 114, 2-B10 (1983)
- The Ultraviolet Spectra of Three N-Type Carbon Stars. *Hollis R. Johnson and George T. O'Brien*. **265**, 952, 23-B14 (1983)
- Accurate Radial Velocities for Carbon Stars in Draco and Ursa Minor: The First Hint of a Dwarf Spheroidal Mass-to-Light Ratio. *Marc Aaronson*. **266**, L11, 32-A12 (1983)
- SiS Maser Emission from IRC +10°216. *Christian Henkel, Henry E. Matthews, and Mark Morris*. **267**, 184, 42-A1 (1983)
- Carbon Stars and the Seven Dwarfs. *Marc Aaronson, Edward W. Olszewski, and Paul W. Hodge*. **267**, 271, 42-G5 (1983)
- The Dust around the Carbon Star IRC +10216. *M. Jura*. **267**, 647, 47-G8 (1983)
- The C<sub>2</sub>H, C<sub>2</sub>, and CN Electronic Absorption Bands in the Carbon Star HD 19557. *J. H. Goebel, J. D. Bregman, D. M. Cooper, D. Goorvitch, S. R. Langhoff, and F. C. Witteborn*. **270**, 190, 79-A7 (1983)
- Long-Period Variables in the Magellanic Clouds: Supergiants, AGB Stars, Supernova Precursors, Planetary Nebula Precursors, and Enrichment of the Interstellar Medium. *P. R. Wood, M. S. Bessell, and M. W. Fox*. **272**, 99, 102-B8 (1983)
- A Comment on Red Supergiant Variables in the SMC. *Jay A. Frogel*. **272**, 116, 102-C11 (1983)
- The Abundance of Carbon in Planetary Nebulae. *Howard B. French*. **273**, 214, 114-E5 (1983)
- Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wootten, C. Masson, and M. A. Frerking*. **273**, 633, 120-D13 (1983)
- An Infrared Search for Luminous Stars in the Bar West Field of the Large Magellanic Cloud. *Jay A. Frogel and Harvey B. Richer*. **275**, 84, 138-A1 (1983)
- Carbon Star Formation and Neutron-rich Isotope Formation in Low-Mass Asymptotic Giant Branch Stars. *Icko Iben, Jr.* **275**, L65, 148-D5 (1983)

**Stars: Catalogs**

- A Catalog of Spectral Classification and Photometry of Barium Stars. *P. K. Lü, D. W. Dawson, A. R. Upgren, and E. W. Weis*. **52**, 169, 11-E11 (1983) (Abstr. in **268**, 905, 63-A8)
- The Stellar Component of the Galaxy as Seen by the AFGL Infrared Sky Survey. *Gary L. Grasdale, R. D. Gehrz, J. A. Hackwell, M. Castelaz, and C. Gullixson*. **53**, 413, 22-B7 (1983) (Abstr. in **272**, 787, 110-C12)

**Stars: Cepheids**

- The Structural Properties of Cepheid Velocity Curves. *Norman R. Simon and Terry J. Teays*. **265**, 996, 23-F2 (1983)
- Einstein Observations of Three Classical Cepheids. *Erika Böhm-Vitense and Sidney B. Parsons*. **266**, 171, 28-G6 (1983)
- The Light and Velocity Curves of Classical Cepheids: Theory versus Observation. *Norman R. Simon and Cecil G. Davis*. **266**, 787, 37-A1 (1983)
- The Distance to M33 Based on a New Study of Its Cepheids. *Allan Sandage and George Carlson*. **267**, L25, 45-C14 (1983)
- The Near-Infrared Cepheid Distance Scale. I. Preliminary Galactic Calibration. *R. McGonegal, C. W. McAlary, R. A. McLaren, and B. F. Madore*. **269**, 641, 73-D10 (1983)
- A Comparison between Observed and Theoretical H-R Diagrams for the Young LMC Star Cluster NGC 1866. *Stephen A. Becker and Grant J. Mathews*. **270**, 155, 78-E12 (1983)
- A Search for Light-Time Effects in Binary Cepheids: AW Persei. *Nancy Remage Evans*. **272**, 214, 103-C14 (1983)
- The Distance to NGC 6822 from Infrared Photometry of Cepheids. *Christopher W. McAlary, Barry F. Madore, R. McGonegal, R. A. McLaren, and D. L. Welch*. **273**, 539, 119-D12 (1983)
- A New Calibration of the Extragalactic Distance Scale Using Cepheids and RR Lyrae Stars. *Richard B. Stothers*. **274**, 20, 124-B11 (1983)

Period and Amplitude Variations of Polaris. *A. Arellano Ferro*. **274**, 755, 133-E12 (1983)

Stellar Acoustics. I. Adiabatic Pulse Propagation and Modal Resonance in Polytropic Models of Bump Cepheids. *Charles A. Whitney*. **274**, 830, 134-D6 (1983)

A Search for OB Associations near Southern Long-Period Cepheids. II. CT Carinae, UU Muscae, VZ Puppis, SV Velorum, and EZ Velorum. *Sidney van den Bergh, P. Frank Younger, Elmar B. F. Brosterhus, and Gonzalo Alcaíno*. **53**, 765, 27-B1 (1983) (Abstr. in **274**, 921, 135-E2)

**Stars: Chromospheres**

- An Attempt to Determine Stellar Lyman-Alpha Emission-Line Fluxes for F Stars with Different Metal Abundances. *Erika Böhm-Vitense and Jack Woods*. **265**, 331, 15-F8 (1983)
- The Ultraviolet Spectra of Three N-Type Carbon Stars. *Hollis R. Johnson and George T. O'Brien*. **265**, 952, 23-B14 (1983)
- Einstein Observations of Three Classical Cepheids. *Erika Böhm-Vitense and Sidney B. Parsons*. **266**, 171, 28-G6 (1983)
- Spectral Energy Distributions of Young Stellar Objects. I. A Turbospheric Model for DR Tauri. *Roger K. Ulrich, Allen W. Shafter, George Hawkins, and Gillian Knapp*. **267**, 199, 42-B2 (1983)
- Rapid Rotation and Stellar Activity in the Triple System HD 165590. *Robert A. Stern and Andrew Skumanich*. **267**, 232, 42-D8 (1983)
- Coordinated Einstein and IUE Observations of a Disparitions Brusques Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana*. **267**, 280, 43-A1 (1983)
- An H $\alpha$  Survey of Southern Hemisphere Active Chromosphere Stars. *Bernard W. Bopp and J. B. Hearnshaw*. **267**, 653, 48-A1 (1983)
- The Dependence of H $\alpha$  on Chromospheric Activity in G and K Main-Sequence Stars. *D. M. Zarro*. **267**, L61, 45-F6 (1983)
- Chromospheric Emission of W Ursae Majoris-Type Stars and Its Relation to the Structure of Their Common Envelopes. *Joel A. Eaton*. **268**, 800, 61-G8 (1983)
- The Magnetic Field on the RS Canum Venaticorum Star Lambda Andromedae. *Mark S. Giampapa, Leon Golub, and Simon P. Worden*. **268**, L121, 63-A10 (1983)
- The Narrow Ultraviolet Emission Lines of the Red Dwarf AU Microscopii (dM1.6e). *Thomas R. Ayres, Kjell Eriksson, Jeffrey L. Linsky, and R. E. Stencel*. **270**, L17, 80-B4 (1983)
- Chromospheric and Coronal Emissions from the Giants in the Hyades. *S. L. Baliunas, L. Hartmann, and A. K. Dupree*. **271**, 672, 96-G4 (1983)
- Outer Atmospheres of Cool Stars. XIII. Capella at Critical Phases. *Thomas R. Ayres, Francis H. Schiffer III, and Jeffrey L. Linsky*. **272**, 223, 103-D9 (1983)
- Outer Atmospheres of Cool Stars. XIV. A Model for the Chromosphere and Transition Region of Beta Ceti (G9.5 III). *Kjell Eriksson, Jeffrey L. Linsky, and Theodore Simon*. **272**, 665, 109-A13 (1983)
- The Formation of Emission Lines in the Expanding Chromospheres of Luminous Cool Stars. I. The Importance of Atmospheric Extension and Partial Redistribution Effects. *S. A. Drake and J. L. Linsky*. **273**, 299, 115-E1 (1983)
- The Circumstellar Envelopes and Chromospheres of Cool Giants and Supergiants. *Wendy Hagen, Robert E. Stencel, and Dale F. Dickinson*. **274**, 286, 127-A1 (1983)
- Outer Atmospheres of Cool Stars. XV. High-Dispersion Ultraviolet Studies of Active Chromosphere G-K Dwarfs. *Thomas R. Ayres, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, and Alexander Brown*. **274**, 784, 134-A1 (1983)
- First Detection of Winds in Red Giants by Microwave Continuum Techniques. *S. A. Drake and J. L. Linsky*. **274**, L77, 136-C3 (1983)
- Observations of Active Chromosphere Stars. *Bernard W. Bopp*,



- John L. Africano, R. E. Stencel, P. V. Noah, and A. Klimke. **275**, 691, 145-B2 (1983)
- Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Baliunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning*. **275**, 752, 145-F7 (1983)
- Stellar Chromospheres: H $\alpha$  and Ca II K Profiles. *D. M. Zarro and A. W. Rodgers*. **53**, 815, 27-G1 (1983) (Abstr. in **274**, 922, 135-E3)
- Stars: Circumstellar Shells**
- Molecular Self-Shielding in the Outflows from Late-Type Stars. *M. Morris and M. Jura*. **264**, 546, 8-C5 (1983)
- The Near-Infrared Spectrum of the Herbig Ae-Be Stars. *D. Lorenzetti, P. Saraceno, and F. Strafella*. **264**, 554, 8-C13 (1983)
- Possible Mechanisms for the Hubble-Sandage (S Doradus) Variables. *Richard Stothers and Chao-wen Chin*. **264**, 583, 8-F2 (1983)
- HD 207739: A Strange Composite Star. *Sidney B. Parsons, Albert V. Holm, and Yoji Kondo*. **264**, L19, 5-B4 (1983)
- SiO Isotopic Maser Emission from VY Canis Majoris. *S. Deguchi, J. Good, Y. Fan, X. Mao, D. Wang, and Nobuharu Ukita*. **264**, L65, 11-C8 (1983)
- The Development of Structure in Shearing, Viscous Media. II. *James H. Hunter, Jr. and Tomas Horak*. **265**, 402, 16-D12 (1983)
- Spectral and Temporal Effects of a Plasma Shell around an X-Ray Source. *Kar Man Chang and Nikolaos D. Kylafis*. **265**, 1005, 23-F11 (1983)
- The H I Content of Envelopes around Evolved Stars. *G. R. Knapp and P. F. Bowers*. **266**, 701, 36-A5 (1983)
- Optical Confirmation of a Very Compact Bipolar Nebula Associated with the Symbiotic Star V1016 Cygni. *Joseph Solf*. **266**, L113, 39-C12 (1983)
- Detection of  $J = 5-4$  SiO Masers in Late-Type Stars. *Dan P. Clemens and Adair P. Lane*. **266**, L117, 39-D5 (1983)
- SiS Maser Emission from IRC +10216. *Christian Henkel, Henry E. Matthews, and Mark Morris*. **267**, 184, 42-A1 (1983)
- The Dust around the Carbon Star IRC +10216. *M. Jura*. **267**, 647, 47-G8 (1983)
- High Spatial Resolution VLA Observations of the R Aquarii Jet. *M. Kafatos, J. M. Hollis, and A. G. Michalitsianos*. **267**, L103, 51-C7 (1983)
- High Angular Resolution Observations of Alpha Orionis with a Rotation Shearing Interferometer. *C. Roddier and F. Roddier*. **270**, L23, 81-B9 (1983)
- HL Tauri and Its Circumstellar Disk. *Martin Cohen*. **270**, L69, 87-C14 (1983)
- Rotation among Orion Ic G Stars: Angular Momentum Loss Considerations in Pre-Main-Sequence Stars. *Myron A. Smith, Jacques M. Beckers, and Samuel C. Barden*. **271**, 237, 90-E11 (1983)
- Destruction of Ice Grains in T Tauri Stars. *G. Strazzulla, V. Pirronello, and G. Foti*. **271**, 255, 90-G1 (1983)
- Stationary Flows in the Circumstellar Envelopes of M Giants. *A. G. G. M. Tielens*. **271**, 702, 97-B10 (1983)
- Speckle Interferometry of IRC +10216 in the Fundamental Vibration-Rotation Lines of CO. *H. M. Dyck, S. Beckwith, and B. Zuckerman*. **271**, L79, 100-C7 (1983)
- Radio Images of the Bipolar H II Region S106. *John Bally, Ronald L. Snell, and Read Predmore*. **272**, 154, 102-F7 (1983)
- The Circumstellar Dust of Mu Cephei. *C. Rogers, P. G. Martin, and Dennis R. Crabtree*. **272**, 175, 103-A1 (1983)
- The Infrared Echo of a Type II Supernova with a Circumstellar Dust Shell: Applications to SN 1979c and SN 1980k. *Eliahu Dwek*. **274**, 175, 125-F13 (1983)
- Circumstellar Envelope Structure of Late-Type Stars. *P. F. Bowers, K. J. Johnston, and J. H. Spencer*. **274**, 733, 133-D4 (1983)
- Sharp Shortward-shifted Features in the Spectra of O Subdwarfs. *Frederick C. Bruhweiler and Charles A. Dean*. **274**, L87, 136-D6 (1983)
- The Circumstellar and Nebular Environment of the Becklin-Neugebauer Object:  $\lambda = 2-5$  Micron Spectroscopy. *N. Scofield, S. G. Kleinmann, D. N. B. Hall, and S. T. Ridgway*. **275**, 201, 139-C3 (1983)
- Far-Ultraviolet Emission Lines in U Cephei: Evidence for a Hot, Turbulent Circumstellar Envelope. *Mirek J. Plavec*. **275**, 251, 139-F14 (1983)
- Mass Loss Rates and Anisotropies in the Outflows from Late-Type Stars. *M. Jura*. **275**, 683, 145-A8 (1983)
- The Stellar Component of the Galaxy as Seen by the AFGL Infrared Sky Survey. *Gary L. Grasdal, R. D. Gehrz, J. A. Hackwell, M. Castela, and G. Gullixson*. **53**, 413, 22-B7 (1983) (Abstr. in **272**, 787, 110-C12)
- Ultraviolet Spectroscopic Observations of Some Be Stars of Later Type and A-F Type Shell Stars. *Arne Slettebak and Kenneth G. Carpenter*. **53**, 869, 28-G1 (1983) (Abstr. in **274**, 923, 135-E4)
- Stars: Collapsed**
- Self-similar Stellar Collapse. *Amos Yahil*. **265**, 1047, 24-B13 (1983)
- Amorphous Glassy Plasma in Dense Stellar Matter. *Setsuo Ichimaru, Hiroshi Iyetomi, Shinichi Mitake, and Naoki Itoh*. **265**, L83, 26-D11 (1983)
- Stellar Collapses in the Galaxy. *John N. Bahcall and Tsvi Piran*. **267**, L77, 51-A11 (1983)
- Bulk Viscosity of Degenerate Neutrinos. *Ch. G. van Weert and L. J. van den Horn*. **270**, 315, 80-C12 (1983)
- The Effect of Trapped Lepton Number and Entropy on the Outcome of Stellar Collapse. *Adam Burrows and James M. Lattimer*. **270**, 735, 86-B3 (1983)
- A Search for X-Rays from Runaway Stars. *C. Krishna Kumar, Timothy R. Kallman, and Roger J. Thomas*. **272**, 219, 103-D5 (1983)
- Collapse and Explosion of White Dwarfs. I. Precollapse Evolution. *J. Isern, J. Labay, M. Hernanz, and R. Canal*. **273**, 320, 115-F8 (1983)
- The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35$  c. *B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming*. **273**, L65, 123-B3 (1983)
- Stars: Combination Spectra**
- Observational Studies of the Symbiotic Stars. II. Emission-Line Relative Intensity Variations in CI Cygni, BF Cygni, AX Persei, and V1016 Cygni. *Nancy A. Oliverson and Christopher M. Anderson*. **268**, 250, 54-F3 (1983)
- The Evidence for Shell Formation in V1016 Cygni. *W. Deuel and H. Nussbaumer*. **271**, L19, 93-B4 (1983)
- The Outbursts of Symbiotic Novae. *Scott J. Kenyon and James W. Truran*. **273**, 280, 115-C10 (1983)
- The 1982 Ultraviolet Eclipse of the Symbiotic Binary AR Pavonis. *J. B. Hutchings, A. P. Cowley, T. B. Ake, and C. L. Imhoff*. **275**, 271, 140-A6 (1983)
- Observations of Two Peculiar Emission Objects in the Large Magellanic Cloud. *M. Kafatos, A. G. Michalitsianos, D. A. Allen, and R. E. Stencel*. **275**, 584, 144-A1 (1983)
- Spectrophotometric Observations of Symbiotic Stars and Related Objects. *William P. Blair, Robert E. Stencel, Walter A. Feibelman, and Andrew G. Michalitsianos*. **53**, 573, 24-F7 (1983) (Abstr. in **273**, 839, 122-F9)
- Stars: Coronae**
- A Giant X-Ray Flare in the Hyades. *Robert A. Stern, James*

**Stars: Coronae—Continued**

- H. Underwood, and Spiro K. Antiochos.* **264**, L55, 11-B11 (1983)
- Closed and Open Magnetic Fields in Stellar Winds. *D. J. Mullan and R. S. Steinolfson.* **266**, 823, 37-C14 (1983)
- Coordinated Einstein and IUE Observations of a Disruptions Brusques Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana.* **267**, 280, 43-A1 (1983)
- First Observations of Stellar Coronal Structure: The Coronae of AR Lacertae. *Frederick M. Walter, David M. Gibson, and Gabor S. Basri.* **267**, 665, 48-A13 (1983)
- Infall and Outflow of  $S^{+3}$  Ions in 15 Monocerotis, Tau Canis Majoris, and Iota Orionis. *Donald C. Morton.* **268**, 217, 54-C12 (1983)
- An X-Ray Survey of Nine Algol Systems. *N. E. White and F. E. Marshall.* **268**, L117, 64-A9 (1983)
- The Magnetic Field on the RS Canum Venaticorum Star Lambda Andromedae. *Mark S. Giampapa, Leon Golub, and Simon P. Worden.* **268**, L121, 63-A10 (1983)
- Measurement of Coronal X-Ray Emission Lines from Capella. *Peter W. Vedder and Claude R. Canizares.* **270**, 666, 85-D2 (1983)
- Einstein Observations of X-Ray Emission from A Stars. *L. Golub, F. R. Harnden, Jr., C. W. Maxson, R. Rosner, G. S. Vaiana, Webster Cash, Jr., and Theodore P. Snow, Jr.* **271**, 264, 90-G11 (1983)
- Chromospheric and Coronal Emissions from the Giants in the Hyades. *S. L. Baliunas, L. Hartmann, and A. K. Dupree.* **271**, 672, 96-G4 (1983)
- X-Rays and Rotation among Post-T Tauri G Stars in Orion Ic. *Myron A. Smith, Steven H. Pravdo, and William H.-M. Ku.* **272**, 163, 102-G2 (1983)
- HEAO 1 Observations of Quiescent X-Ray Emission from Flare Stars: Erratum. *Vassiliki Tsikoudi.* **272**, 381, 105-B8 (1983) (Orig. paper in **262**, 263, 124-A1)
- Outer Atmospheres of Cool Stars. XIV. A Model for the Chromosphere and Transition Region of Beta Ceti (G9.5 III). *Kjell Eriksson, Jeffrey L. Linsky, and Theodore Simon.* **272**, 665, 109-A13 (1983)
- Bright, Rapid, Highly Polarized Radio Spikes from the M Dwarf AD Leonis. *Kenneth R. Lang, Jay Bookbinder, Leon Golub, and Michael M. Davis.* **272**, L15, 105-E8 (1983)
- Microwave Emission from the Coronae of Late-Type Dwarf Stars. *Jeffrey L. Linsky and Dale E. Gary.* **274**, 776, 133-G5 (1983)
- On the Coronae of Rapidly Rotating Stars. IV. Coronal Activity in F Dwarfs and Implications for the Onset of the Dynamo. *F. M. Walter.* **274**, 794, 134-A12 (1983)
- Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold.* **274**, 801, 134-B5 (1983)
- A Giant X-Ray Flare in the Hyades: Erratum. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos.* **275**, L25, 141-G9 (1983) (Orig. paper in **264**, L55, 11-B11)
- Stars: Diameters**
- Stellar Diameter Measurements by Two-Aperture Interferometry in the Infrared. *G. P. Di Benedetto and G. Conti.* **268**, 309, 55-C10 (1983)
- High Angular Resolution Observations of Alpha Orionis with a Rotation Shearing Interferometer. *C. Roddier and F. Roddier.* **270**, L23, 81-B9 (1983)
- Stars: Dwarf Novae**
- Radial Velocity Studies of Cataclysmic Binaries. I. KR Aurigae. *Allen W. Shafter.* **267**, 222, 42-C11 (1983)
- Time-resolved Spectrophotometry of the Emission Lines in the Galactic X-Ray Source H2252-035. *John T. Clarke, Keith O. Mason, and Stuart Bowyer.* **267**, 726, 48-F8 (1983)
- Angular Momentum Loss and the Evolution of Cataclysmic Binaries. *Ronald E. Taam.* **268**, 361, 55-G6 (1983)
- The Minimum Period and the Gap in Periods of Cataclysmic Binaries. *Bohdan Paczyński and Ryszard Sienkiewicz.* **268**, 825, 62-B7 (1983)
- The Correlated X-Ray and Optical Time Variability of TT Arietis. *K. A. Jensen, France A. Córdova, J. Middleditch, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer.* **270**, 211, 79-B14 (1983)
- The Breakdown of Nuclear Quasi-Equilibrium in Highly Compact Binaries and the Origin of the 2-3 Hour Gap in the Orbital Period Distribution of Cataclysmic Variables. *P. C. Joss and S. Rappaport.* **270**, L73, 87-D3 (1983)
- The Precataclysmic Nucleus of Abell 41. *Albert D. Grauer and Howard E. Bond.* **271**, 259, 90-G5 (1983)
- Identification of CW 1103+254 as a New Magnetic Variable. *H. S. Stockman, C. B. Foltz, G. D. Schmidt, and S. Tapia.* **271**, 725, 97-D5 (1983)
- Magnetism in the AM Herculis Variable CW 1103+254. *Gary D. Schmidt, H. S. Stockman, and Steven A. Grandi.* **271**, 735, 97-E1 (1983)
- Ultraviolet Photometry of Dwarf Novae in Outburst. *Chi-Chao Wu and Robert J. Panek.* **271**, 754, 97-F7 (1983)
- On the Nature of Dwarf Novae. *J. Smak.* **272**, 234, 103-E6 (1983)
- Photoionization Models for the Winds from Cataclysmic Variables. *T. R. Kallman.* **272**, 238, 103-E10 (1983)
- Time-resolved Spectrophotometry of the Nova-like Variable US Ursae Majoris. *Eric M. Schlegel, R. Kent Honeycutt, and Ronald H. Kaitchuck.* **53**, 397, 22-A5 (1983) (Abstr. in **272**, 786, 110-C11)
- Spectroscopy of Cataclysmic Variables. I. Observations. *Glen Williams.* **53**, 523, 24-A2 (1983) (Abstr. in **273**, 839, 122-F9)
- Stars: Early-Type**
- Meridional Circulation of Rotating Stars. IV. The Approach to the Mean Steady State in Early-Type Stars. *Jean-Louis Tassoul and Monique Tassoul.* **264**, 298, 4-B3 (1983)
- Infrared Photometry of O Stars. *John I. Castor and Theodore Simon.* **265**, 304, 15-D9 (1983)
- An Alternative Model for the Atmospheres of Wolf-Rayet and O Stars. *Anne B. Underhill.* **265**, 933, 23-A9 (1983)
- Spectrophotometry of B, A, and F Stars. III. *Saul J. Adelman and Diane M. Pyper.* **266**, 732, 36-C10 (1983)
- A Comment on "A Comparative Study of Rotational Properties of High-Velocity and Low-Velocity Early-Type Stars". *Nolan R. Walborn.* **267**, L59, 45-F4 (1983)
- A Survey of Spectral Morphology and Rotational Velocities among the Helium-rich Stars. *Nolan R. Walborn.* **268**, 195, 54-B3 (1983)
- Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. *Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers.* **268**, 205, 54-B14 (1983)
- Infall and Outflow of  $S^{+3}$  Ions in 15 Monocerotis, Tau Canis Majoris, and Iota Orionis. *Donald C. Morton.* **268**, 217, 54-C12 (1983)
- Episodic Mass Loss and Narrow Lines in Gamma Cassiopeiae and in Other Early-Type Stars. *H. F. Henrichs, G. Hamerschlag-Hensberge, I. D. Howarth, and P. Barr.* **268**, 807, 62-A1 (1983)
- H $\alpha$  Line Profiles in B Stars: Comparison of Theory and Observations. *J. N. Heasley and Sidney C. Wolff.* **269**, 634, 73-C14 (1983)
- The Spectra of 12 New Subluminous O Stars. *J. S. Drilling.* **270**, L13, 81-A14 (1983)
- Meridional Circulation in Rotating Stars. VI. The Effects of Anisotropic Eddy Viscosity. *Monique Tassoul and Jean-Louis*

- Tassoul*. **271**, 315, 91-D6 (1983)
- X-Ray Spectra of Orion OB Supergiants. *Joseph P. Cassinelli and J. H. Swank*. **271**, 681, 97-A1 (1983)
- A Search for X-Rays from Runaway Stars. *C. Krishna Kumar, Timothy R. Kallman, and Roger J. Thomas*. **272**, 219, 103-D5 (1983)
- The Extreme LMC Supergiant HD 38489: An Optical and Ultraviolet Study. *Steven N. Shore and N. Sanduleak*. **273**, 177, 114-B8 (1983)
- The Evolution of Massive Stars: The Numbers and Distribution of O Stars and Wolf-Rayet Stars. *Peter S. Conti, Catharine D. Garmany, C. de Loore, and D. Vanbeveren*. **274**, 302, 127-B3 (1983)
- The Formation of Resonance Lines in Locally Nonmonotonic Winds. II. An Amplitude Diagnostic. *L. B. Lucy*. **274**, 372, 127-G3 (1983)
- The Circumstellar and Nebular Environment of the Becklin-Neugebauer Object:  $\lambda = 2-5$  Micron Spectroscopy. *N. Scofield, S. G. Kleinmann, D. N. B. Hall, and S. T. Ridgway*. **275**, 201, 139-C3 (1983)
- UBV Photometry for Southern OB Stars. *R. E. Schild, R. F. Garrison, and W. A. Hiltner*. **51**, 321, 7-A2 (1983) (Abstr. in **266**, 903, 38-B12)
- Massive Eclipsing Binary Candidates. *R. F. Garrison, R. E. Schild, and W. A. Hiltner*. **52**, 1, 9-A2 (1983) (Abstr. in **267**, 892, 50-D14)
- The Magnetic Fields of the Helium-weak B Stars. *Ermanno F. Borra, J. D. Landstreet, and Ian Thompson*. **53**, 151, 18-D13 (1983) (Abstr. in **271**, 894, 99-C2)
- The S201 Far-Ultraviolet Imaging Survey. I. Two Fields at High Galactic Latitude. *George R. Carruthers and Thornton Page*. **53**, 623, 25-C1 (1983) (Abstr. in **273**, 841, 122-F11)
- Stars: Eclipsing Binaries**
- Four-Color Photometry of RZ Ophiuchi and Its Accretion Disk. *Edward C. Olson and Jeffrey P. Hickey*. **264**, 251, 3-E9 (1983)
- WY Sagittae (Nova 1783): Spectroscopic Confirmation of Weaver's Candidate and Discovery of Deep Eclipses. *Michael M. Shara and Anthony F. J. Moffat*. **264**, 560, 8-D5 (1983)
- IUE Observations of Gas Stream Effects in the Ultraviolet Spectrum of U Cephei: Erratum. *Yoji Kondo, George E. McCluskey, and Robert E. Stencel*. **264**, 746, 10-D10 (1983) (Orig. paper in **233**, 906, 103-D11)
- Spectroscopic and Photometric Analysis of the WN7 Eclipsing Binary CQ Cephei. *Kam-Ching Leung, Anthony F. J. Moffat, and Wilhelm Seggewiss*. **265**, 961, 23-C9 (1983)
- International Ultraviolet Explorer Observations of the Peculiar Variable Spectrum of the Eclipsing Binary R Arae. *George E. McCluskey and Yoji Kondo*. **266**, 755, 36-E6 (1983)
- High-Energy X-Ray Observations of Vela X-1. *M. Bautz, S. Howe, A. Gorecki, F. Lang, A. Levine, F. Primini, and W. H. G. Lewin*. **266**, 794, 37-A8 (1983)
- Time-resolved Spectrophotometry of the Nova-like Variable RW Trianguli. *Ronald H. Kaitchuck, R. Kent Honeycutt, and Eric M. Schlegel*. **267**, 239, 42-E1 (1983)
- Detection of Flarelike Events and Their Relationship to Presumed Spot Regions of V471 Tauri: A Solar-Stellar Connection. *Arthur Young, A. Klimke, John L. Africano, Rob Quigley, Richard R. Radick, and Dave Van Buren*. **267**, 655, 48-A3 (1983)
- First Observations of Stellar Coronal Structure: The Coronae of AR Lacertae. *Frederick M. Walter, David M. Gibson, and Gabor S. Basri*. **267**, 665, 48-A13 (1983)
- Chromospheric Emission of W Ursae Majoris-Type Stars and Its Relation to the Structure of Their Common Envelopes. *Joel A. Eaton*. **268**, 800, 61-G8 (1983)
- The X-Ray Absorption Spectrum of 4U 1700-37 and Its Implications for the Stellar Wind of the Companion HD 153919. *N. E. White, T. R. Kallman, and J. H. Swank*. **269**, 264, 68-A13 (1983)
- The Partial Phase of the Eclipse of Epsilon Aurigae. *Robert D. Chapman, Yoji Kondo, and Robert E. Stencel*. **269**, L17, 69-B3 (1983)
- IUE Observations of the Perplexing Bipolar Planetary Nebula NGC 2346. *Walter A. Feibelman and Lawrence H. Aller*. **270**, 150, 78-E6 (1983)
- Stellar Images Derived from Rotation Broadening: AW Ursae Majoris. *Lawrence Anderson, Darryl Stanford, and Douglas Leininger*. **270**, 200, 79-B3 (1983)
- Discovery of Eclipses in the X-Ray Source HD 155638. *Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry*. **270**, L79, 87-D8 (1983)
- Secondaries of Eclipsing Binaries. V. EK Cephei. *Jocelyn Tomkin*. **271**, 717, 97-C11 (1983)
- A New Look at BE Ursae Majoris. *D. Crampton, A. P. Cowley, and J. B. Hutchings*. **272**, 202, 103-C2 (1983)
- RW Tauri as a Weak W Serpentis Star. *Mirek J. Plavec and Jan J. Dobias*. **272**, 206, 103-C6 (1983)
- Discovery of Eclipse Polarization in Algol. *James C. Kemp, Gary D. Henson, Mark S. Barbour, Daniel J. Kraus, and George W. Collins II*. **273**, L85, 123-C7 (1983)
- Lambda Tauri: A Probe of Angular Momentum Loss in Algol Binaries. *Charles D. Bailyn and Peter P. Eggleton*. **274**, 763, 133-F6 (1983)
- Far-Ultraviolet Emission Lines in U Cephei: Evidence for a Hot, Turbulent Circumstellar Envelope. *Mirek J. Plavec*. **275**, 251, 139-F14 (1983)
- The 1982 Ultraviolet Eclipse of the Symbiotic Binary AR Pavonis. *J. B. Hutchings, A. P. Cowley, T. B. Ake, and C. L. Imhoff*. **275**, 271, 140-A6 (1983)
- Optical Pulsations from HZ Herculis/Hercules X-1: The Self-consistent 35 Day Picture. *John Middleitch*. **275**, 278, 140-A14 (1983)
- Massive Eclipsing Binary Candidates. *R. F. Garrison, R. E. Schild, and W. A. Hiltner*. **52**, 1, 9-A2 (1983) (Abstr. in **267**, 892, 50-D14)
- General Properties of Algol Binaries. *G. Giuricin, F. Mardirrossian, and M. Mezzetti*. **52**, 35, 9-E1 (1983) (Abstr. in **267**, 892, 50-D14)
- A  $u$ by,  $\beta$  Photometric Survey of Southern Hemisphere Eclipsing Binary Stars. *George W. Wolf and Janet T. Kern*. **52**, 429, 16-B7 (1983) (Abstr. in **270**, 780, 86-E7)
- Time-resolved Spectrophotometry of the Nova-like Variable US Ursae Majoris. *Eric M. Schlegel, R. Kent Honeycutt, and Ronald H. Kaitchuck*. **53**, 397, 22-A5 (1983) (Abstr. in **272**, 786, 110-C11)
- Stars: Emission-Line**
- H $\alpha$  Emission and Mass Loss from Metal-poor Giants. *Raffaele G. Gratton*. **264**, 223, 3-C9 (1983)
- The Near-Infrared Spectrum of the Herbig Ae-Be Stars. *D. Lorenzetti, P. Saraceno, and F. Strafella*. **264**, 554, 8-C13 (1983)
- An Attempt to Determine Stellar Lyman-Alpha Emission-Line Fluxes for F Stars with Different Metal Abundances. *Erika Böhm-Vitense and Jack Woods*. **265**, 331, 15-F8 (1983)
- The Exciting Stars of Herbig-Haro Objects. *Martin Cohen and Richard D. Schwartz*. **265**, 877, 22-C13 (1983)
- Jets from Pre-Main-Sequence Stars: AS 353A and Its Associated Herbig-Haro Objects. *Reinhard Mundt, John Stocke, and Herve S. Stockman*. **265**, L71, 26-C13 (1983)
- IUE Observations of E1405-451: A New AM Herculis Type Cataclysmic Variable. *J. A. Nousek and S. H. Pravdo*. **266**, L39, 32-C8 (1983)
- A Large-Amplitude Photometric Periodicity on a T Tauri Star. *Bradley E. Schaefer*. **266**, L45, 32-C13 (1983)
- Optical Confirmation of a Very Compact Bipolar Nebula AS

**Stars: Emission-Line-Continued**

- sociated with the Symbiotic Star V1016 Cygni. *Joseph Solf*. **266**, L113, 39-C12 (1983)
- An H $\alpha$  Survey of Southern Hemisphere Active Chromosphere Stars. *Bernard W. Bopp and J. B. Hearnshaw*. **267**, 653, 48-A1 (1983)
- Survey of H $\alpha$  Emission in Globular Cluster Red Giants. *C. Cacciari and K. C. Freeman*. **268**, 185, 54-A7 (1983)
- Observational Studies of the Symbiotic Stars. II. Emission-Line Relative Intensity Variations in CI Cygni, BF Cygni, AX Persei, and V1016 Cygni. *Nancy A. Oliverson and Christopher M. Anderson*. **268**, 250, 54-F3 (1983)
- HH 1 and HH 2: The Results of an Eruptive Event in the Cohen-Schwartz Star? *Reinhard Mundt and Lee Hartmann*. **268**, 766, 61-E2 (1983)
- Ultraviolet Continuum and H $\gamma$  Fluorescent Emission in Herbig-Haro Objects 43 and 47. *Richard D. Schwartz*. **268**, L37, 57-C14 (1983)
- Narrow-Band Photometric Periods in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi*. **269**, 605, 73-A11 (1983)
- On the Contributions of the Orion Reflection Nebulosity to the Continuous UV Spectrum of the Herbig-Haro Objects HH 1 and HH 2 and of the C-S Star. *Reinhard Mundt and Adolf N. Witt*. **270**, L59, 87-C6 (1983)
- The Evidence for Shell Formation in V1016 Cygni. *W. Deuel and H. Nussbaumer*. **271**, L19, 93-B4 (1983)
- Optical Study of a Possible Bipolar Flow Associated with Herbig-Haro 12. *Karen M. Strom, Stephen E. Strom, and John Stocke*. **271**, L23, 93-B7 (1983)
- RW Tauri as a Weak W Serpentiis Star. *Mirek J. Plavec and Jan J. Dobias*. **272**, 206, 103-C6 (1983)
- Stimulated Emission and the Flat Balmer Decrements of Cataclysmic Variable Stars. *Moshe Elitzur, G. J. Ferland, W. G. Mathews, and G. A. Shields*. **272**, L55, 111-B3 (1983)
- VLA Continuum and OH Line Emission Observations of the Compact Nebula VY2-2. *E. R. Seaquist and L. E. Davis*. **274**, 659, 132-E14 (1983)
- Far-Ultraviolet Emission Lines in U Cephei: Evidence for a Hot, Turbulent Circumstellar Envelope. *Mirek J. Plavec*. **275**, 251, 139-F14 (1983)
- Broad Emission Features in QSOs and Active Galactic Nuclei. I. New Calculations of Fe II Line Strengths. *Hagai Netzer and Beverley J. Willis*. **275**, 445, 142-D4 (1983)
- Observations of Two Peculiar Emission Objects in the Large Magellanic Cloud. *M. Kafatos, A. G. Michalitsianos, D. A. Allen, and R. E. Stencel*. **275**, 584, 144-A1 (1983)
- The Case Low-Dispersion Northern Sky Survey. I. *Peter Pesch and N. Sanduleak*. **51**, 171, 3-D1 (1983) (Abstr. in **263**, 1006, 142-F7)
- Spectrophotometric Observations of Symbiotic Stars and Related Objects. *William P. Blair, Robert E. Stencel, Walter A. Feibelman, and Andrew G. Michalitsianos*. **53**, 573, 24-F7 (1983) (Abstr. in **273**, 839, 122-F9)

**Stars: Evolution**

- The Ages and Compositions of Old Clusters. *Kenneth Janes and Pierre Demarque*. **264**, 206, 3-B6 (1983)
- The Cyanogen Distribution of the Red Giants in M5. *Graeme H. Smith and John Norris*. **264**, 215, 3-C1 (1983)
- Evolutionary Effects of Helium Diffusion in Population II Stars. *Guy S. Stringfellow, Peter Bodenheimer, Peter D. Noerdlinger, and Richard J. Arigo*. **264**, 228, 3-C14 (1983)
- Age Calibrations of Magellanic Cloud Clusters. *P. W. Hodge*. **264**, 470, 7-D10 (1983)
- Faint Star Studies in the Magellanic Clouds. I. RICHFLD Photographic Photometry in NGC 2257. *L. L. Stryker*. **266**, 82, 27-G3 (1983)
- Studies of Late-Type Dwarfs. V. Theoretical Models for Lower Main-Sequence Stars. *Don A. Vandenberg, F. D. A. Har-*

*twick, P. Dawson, and David R. Alexander*. **266**, 747, 36-D12 (1983)

- Carbon Stars and the Seven Dwarfs. *Marc Aaronson, Edward W. Olszewski, and Paul W. Hodge*. **267**, 271, 42-G5 (1983)
- Models of X-Ray Bursters with Radius Expansion. *Bohdan Paczyński*. **267**, 315, 43-C11 (1983)
- Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart*. **267**, L89, 51-B7 (1983)
- The Binary Nature of the Barium Stars. II. Velocities, Binary Frequency, and Preliminary Orbits. *Robert D. McClure*. **268**, 264, 54-G3 (1983)
- Angular Momentum Loss and the Evolution of Cataclysmic Binaries. *Ronald E. Taam*. **268**, 361, 55-G6 (1983)
- The Minimum Period and the Gap in Periods of Cataclysmic Binaries. *Bohdan Paczyński and Ryszard Sienkiewicz*. **268**, 825, 62-B7 (1983)
- Further Observations of the Long-Period Binary Pulsar PSR 0820+02. *R. N. Manchester, Lynette M. Newton, D. J. Cooke, P. R. Backus, M. Damashek, J. H. Taylor, and J. J. Condon*. **268**, 832, 62-B14 (1983)
- The Discovery of Nonradial Instability Strips for Hot, Evolved Stars. *Sumner G. Starrfield, Arthur N. Cox, Stephen W. Hodson, and W. D. Pesnell*. **268**, L27, 57-C3 (1983)
- A Two-dimensional Supernova Model with Rotation and Nuclear Burning. *Peter Bodenheimer and S. E. Woosley*. **269**, 281, 68-C3 (1983)
- A Survey of the Core Helium Flash with Dynamic Convection. *Robert G. Deupree and Peter W. Cole*. **269**, 676, 73-G5 (1983)
- A Comparison between Observed and Theoretical H-R Diagrams for the Young LMC Star Cluster NGC 1866. *Stephen A. Becker and Grant J. Mathews*. **270**, 155, 78-E12 (1983)
- Do All Barium Stars Have a White Dwarf Companion? *James F. Dominy and David L. Lambert*. **270**, 180, 78-G11 (1983)
- On the Evolutionary Status of Bright, Low-Mass X-Ray Sources. *R. F. Webbink, S. Rappaport, and G. J. Savonije*. **270**, 678, 85-E1 (1983)
- The Evolution of a Stripped Giant-Neutron Star Binary. *Ronald E. Taam*. **270**, 694, 85-F4 (1983)
- The Breakdown of Nuclear Quasi-Equilibrium in Highly Compact Binaries and the Origin of the 2-3 Hour Gap in the Orbital Period Distribution of Cataclysmic Variables. *P. C. Joss and S. Rappaport*. **270**, L73, 87-D3 (1983)
- The Evolution of Large Planetary Nebulae and Their Central Stars. *James B. Kaler*. **271**, 188, 90-A9 (1983)
- Confirmation among Visual Multiples of an Increase of Ap Stars with Age. *Helmut A. Abt and Octavio Cardona*. **272**, 182, 103-A8 (1983)
- On the Evolution of Massive Zero-Metal Stars. *V. Castellani, A. Chieffi, and A. Tornambé*. **272**, 249, 103-F7 (1983)
- Reverse Stellar Evolution, Stellar Ablation, and the Origin of Gas in Quasars. *William G. Mathews*. **272**, 390, 106-A12 (1983)
- Late Stages of Stellar Evolution. II. Mass Loss and the Transition of Asymptotic Giant Branch Stars into Hot Remnants. *Detlef Schönberner*. **272**, 708, 109-E2 (1983)
- Pulsational Constraints on the Mass and Luminosity of R Coronae Borealis Stars. *Hideyuki Saio and J. Craig Wheeler*. **272**, L25, 105-F3 (1983)
- The Abundance of Carbon in Planetary Nebulae. *Howard B. French*. **273**, 214, 114-E5 (1983)
- The Nature of R136a, the Superluminous Central Object of the 30 Doradus Nebula. *Blair D. Savage, Edward L. Fitzpatrick, Joseph P. Cassinelli, and Dennis C. Ebbets*. **273**, 597, 120-B1 (1983)
- OH/IR Masers. IV. Evolution, Pulsation, and Nature of the Sources. *Terry J. Jones, A. R. Hyland, P. R. Wood, and Ian Gatley*. **273**, 669, 121-A1 (1983)



- OH/IR Stars: Late Stages of Evolution of Intermediate-Mass Stars. *Teije de Jong*. **274**, 252, 125-E7 (1983)
- The Evolution of Massive Stars: The Numbers and Distribution of O Stars and Wolf-Rayet Stars. *Peter S. Conti, Catharine D. Garmany, C. de Loore, and D. Vanbeveren*. **274**, 302, 127-B3 (1983)
- The Birthline for Low-Mass Stars. *Steven W. Stahler*. **274**, 822, 134-C12 (1983)
- Rapid Rotation among Pleiades K Dwarfs. *David R. Soderblom, Burton F. Jones, and Merle F. Walker*. **274**, L37, 129-C12 (1983)
- The Age and Composition of the LMC Red Globular Cluster NGC 2121. *Phillip Flower, Douglas Geisler, Paul Hodge, Edward Olszewski, and Robert Schommer*. **275**, 15, 137-B7 (1983)
- A New Technique for Calculations of Binary Stellar Evolution, with Application to Magnetic Braking. *S. Rappaport, F. Verbunt, and P. C. Joss*. **275**, 713, 145-C10 (1983)
- The Rotation of Horizontal-Branch Stars. II. Members of the Globular Clusters M3, M5, and M13. *Ruth C. Peterson*. **275**, 737, 145-E6 (1983)
- Carbon Star Formation and Neutron-rich Isotope Formation in Low-Mass Asymptotic Giant Branch Stars. *Icko Iben, Jr.* **275**, L65, 148-D5 (1983)
- Star Clusters and Stellar Evolution. I. Improved Synthetic Color-Magnitude Diagrams for the Oldest Clusters. *Don A. VandenBerg*. **51**, 29, 1-D1 (1983) (Abstr. in **263**, 1006, 142-F7)
- Color-Magnitude Studies of Globular Clusters. I. The Bright Stars in NGC 362: Erratum. *William E. Harris*. **51**, 269, 5-C1 (1983) (Orig. paper in **50**, 573, 31-D1)
- General Properties of Algol Binaries. *G. Giuricin, F. Mardirossian, and M. Mezzetti*. **52**, 35, 9-E1 (1983) (Abstr. in **267**, 892, 50-D14)
- Rotational Studies of Late-Type Stars. II. Ages of Solar-Type Stars and the Rotational History of the Sun. *David R. Soderblom*. **53**, 1, 17-A3 (1983) (Abstr. in **271**, 889, 99-B11)
- Stars: Faint Blue**
- Spectroscopy of Variable Blue Stellar Objects. *Peter D. Usher, Archibald Warnock III, and Richard F. Green*. **269**, 73, 65-F12 (1983)
- Stars: Flare**
- A Giant X-Ray Flare in the Hyades. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos*. **264**, L55, 11-B11 (1983)
- Coordinated *Einstein* and *IUE* Observations of a *Disparitions Brusques* Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana*. **267**, 280, 43-A1 (1983)
- Detection of Flarelike Events and Their Relationship to Presumed Spot Regions of V471 Tauri: A Solar-Stellar Connection. *Arthur Young, A. Klimke, John L. Africano, Rob Quigley, Richard R. Radick, and Dave Van Buren*. **267**, 655, 48-A3 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. *Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Batty, R. F. Haynes, Alan E. Wright, and George D. Nicolson*. **268**, L23, 57-B13 (1983)
- Einstein* Observations of the Rho Ophiuchi Dark Cloud: An X-Ray Christmas Tree. *Thierry Montmerle, Lydie Koch-Miramond, Edith Falgarone, and Jonathan E. Grindlay*. **269**, 182, 67-A11 (1983)
- Rotational Studies of Late-Type Stars. III. Rotation among BY Draconis Stars. *Steven S. Vogt, David R. Soderblom, and G. Donald Penrod*. **269**, 250, 67-G11 (1983)
- HEAO 1* Observations of Quiescent X-Ray Emission from Flare Stars: Erratum. *Vassiliki Tsikoudi*. **272**, 381, 105-B8 (1983) (Orig. paper in **262**, 263, 124-A1)
- Bright, Rapid, Highly Polarized Radio Spikes from the M Dwarf AD Leonis. *Kenneth R. Lang, Jay Bookbinder, Leon Golub, and Michael M. Davis*. **272**, L15, 105-E8 (1983)
- Microwave Emission from the Coronae of Late-Type Dwarf Stars. *Jeffrey L. Linsky and Dale E. Gary*. **274**, 776, 133-G5 (1983)
- A Giant X-Ray Flare in the Hyades: Erratum. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos*. **275**, L25, 141-G9 (1983) (Orig. paper in **264**, L55, 11-B11)
- Stars: Formation**
- Protostellar Rotation: Turbulence and Heating of Molecular Clouds. *José Franco*. **264**, 508, 7-G6 (1983)
- Time Evolution of Disk Galaxies Undergoing Stochastic Self-propagating Star Formation. *Wendy L. Freedman and Barry F. Madore*. **265**, 140, 13-E11 (1983)
- The Effects of Induced Star Formation on the Evolution of the Galaxy. II. The Galactic Ecosystem. *Steven N. Shore*. **265**, 202, 14-C14 (1983)
- The Development of Structure in Shearing, Viscous Media. II. *James H. Hunter, Jr. and Tomas Horak*. **265**, 402, 16-D12 (1983)
- Self-regulating Star Formation: The Rate Limit Set by Ionizing Photons. *Donald P. Cox*. **265**, L61, 26-C4 (1983)
- Small Rotating Clouds of Stellar Mass in Orion Molecular Cloud 1. *Andrew Harris, C. H. Townes, D. N. Matsakis, and Patrick Palmer*. **265**, L63, 26-C6 (1983)
- Dense Cores in Dark Clouds. II.  $\text{NH}_3$  Observations and Star Formation. *P. C. Myers and P. J. Benson*. **266**, 309, 30-C10 (1983)
- Toward Explaining Seyfert Galaxies. *Daniel W. Weedman*. **266**, 479, 33-E5 (1983)
- Three-Dimensional Computer Simulations of Star Formation in Dwarf Galaxies. *Neil F. Comins*. **266**, 543, 34-B14 (1983)
- The Role of the Gas in Propagating Star Formation. *Philip E. Seiden*. **266**, 555, 34-C12 (1983)
- X-Ray and Ultraviolet Observations of Extragalactic H II Regions. *G. Fabbiano and N. Panagia*. **266**, 568, 34-D12 (1983)
- The Molecular Cloud Complex Associated with ON 1. *F. P. Israel and H. A. Wootten*. **266**, 580, 34-E10 (1983)
- Infrared Line and Radio Continuum Emission of Circumstellar Ionized Regions. *M. Simon, M. Felli, L. Cassar, J. Fischer, and M. Massi*. **266**, 623, 35-B1 (1983)
- Atomic Hydrogen Associated with the High-Velocity Flow in NGC 2071. *John Bally and Antony A. Stark*. **266**, L61, 32-D13 (1983)
- Star Formation in the Semistellar Nucleus of M33. *Robert W. O'Connell*. **267**, 80, 40-G7 (1983)
- Star Bursts and the Extraordinary Galaxy NGC 3690. *R. D. Gehrz, R. A. Sramek, and D. W. Weedman*. **267**, 551, 46-G7 (1983)
- Formation of OB Clusters: W33 Complex. *Aubrey D. Haschick and Paul T. P. Ho*. **267**, 638, 47-F13 (1983)
- A Variable Radio Source in the Clumpy Irregular Galaxy Markarian 297. *D. S. Heeschen, J. Heidmann, and Q. F. Yin*. **267**, L73, 51-A7 (1983)
- Dynamical Constraints on Star Formation Efficiency. *Robert D. Mathieu*. **267**, L97, 51-C2 (1983)
- The Equilibria of Rotating, Isothermal Clouds. I. Method of Solution. *Steven W. Stahler*. **268**, 155, 53-F5 (1983)
- The Equilibria of Rotating, Isothermal Clouds. II. Structure and Dynamical Stability. *Steven W. Stahler*. **268**, 165, 53-G1 (1983)
- Accretion-driven Star Formation in Central Dominant Galaxies in X-Ray Clusters. *Craig L. Sarazin and Robert W. O'Connell*. **268**, 552, 59-B2 (1983)
- Star-Burst Galactic Nuclei. *Vicki A. Balzano*. **268**, 602, 59-E10 (1983)
- Blue Compact Dwarf Galaxies. II. Near-Infrared Studies and Stellar Populations. *Trinh X. Thuan*. **268**, 667, 60-D11 (1983)

## Stars: Formation—Continued

- HH 1 and HH 2: The Results of an Eruptive Event in the Cohen-Schwartz Star? *Reinhard Mundt and Lee Hartmann*. **268**, 766, 61-E2 (1983)
- VLA Observations of Massive Star Formation in Spiral Nuclei. *J. L. Turner and P. T. P. Ho*. **268**, L79, 63-E10 (1983)
- NGC 1275: A Burgeoning Elliptical Galaxy. *A. Wirth, S. J. Kenyon, and D. A. Hunter*. **269**, 102, 66-A13 (1983)
- CO Observations of the Galaxies in the Leo Triplet: NGC 3623, NGC 3627, and NGC 3628. *Judith S. Young, Linda J. Tacconi, and Nick Z. Scoville*. **269**, 136, 66-E5 (1983)
- The Structure of Bright-rimmed Molecular Clouds. *Alwyn Wootten, Anneila Sargent, Gillian Knapp, and P. J. Huggens*. **269**, 147, 66-F4 (1983)
- A Multifrequency Study of Star Formation in the Blue Compact Dwarf Galaxy I Zw 36. *F. Viallefond and Trinh X. Thuan*. **269**, 444, 71-C11 (1983)
- Simulation Models for the Evolution of Cloud Systems. I. Introduction and Preliminary Simulations. *William A. Pumphrey and John M. Scalo*. **269**, 531, 72-C4 (1983)
- A Rotating Protocluster in W58: HCO<sup>+</sup> Aperture Synthesis Maps. *S. N. Vogel and W. J. Welch*. **269**, 568, 72-F1 (1983)
- Infrared Observations of OB Star Formation in NGC 6334. *Paul M. Harvey and Ian Gatley*. **269**, 613, 73-B5 (1983)
- Spectroscopy of Galaxies in Distant Clusters. II. The Population of the 3C 295 Cluster. *Alan Dressler and James E. Gunn*. **270**, 7, 77-A12 (1983)
- Stochastic Self-propagating Star Formation in Three-dimensional Disk Galaxy Simulations. *Thomas Statler, Neil Comins, and Bruce F. Smith*. **270**, 79, 77-G3 (1983)
- Dense Cores in Dark Clouds. III. Subsonic Turbulence. *P. C. Myers*. **270**, 105, 78-B4 (1983)
- The Distribution of Molecular Clouds in the Nuclear Region of NGC 1068. *N. Z. Scoville, Judith S. Young, and L. B. Lucy*. **270**, 443, 83-A10 (1983)
- Molecular Clouds on the Threshold of Star Formation: The Radial Density Profile of the Cores of the Rho Ophiuchi and R Coronae Australis Clouds. *Robert B. Loren, Aa. Sandkvist, and A. Wootten*. **270**, 620, 84-G9 (1983)
- The Astrometric Position of T Tauri and the Nature of Its Companion. *Robert B. Hanson, B. F. Jones, and D. N. C. Lin*. **270**, L27, 81-B13 (1983)
- Rotation among Orion Ic G Stars: Angular Momentum Loss Considerations in Pre-Main-Sequence Stars. *Myron A. Smith, Jacques M. Beckers, and Samuel C. Barden*. **271**, 237, 90-E11 (1983)
- A 10 Micron Survey of Star Formation in Galactic Nuclei: Virgo Spiral Galaxies. *N. Z. Scoville, E. E. Becklin, Judith S. Young, and R. W. Capps*. **271**, 512, 95-B3 (1983)
- Primordial Star Formation: The Role of Molecular Hydrogen. *Francesco Palla, E. E. Salpeter, and Steven W. Stahler*. **271**, 632, 96-D6 (1983)
- Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck*. **271**, L31, 93-C3 (1983)
- Star Formation within OB Subgroups: Implosion by Multiple Sources. *Richard I. Klein, Maxwell T. Sandford II, and Rodney W. Whitaker*. **271**, L69, 100-B12 (1983)
- The Rate of Star Formation in Normal Disk Galaxies. *Robert C. Kennicutt, Jr.* **272**, 54, 101-E13 (1983)
- Herbig-Haro Objects in the Dust Globule ESO 210-6A. *J. A. Graham and J. H. Elias*. **272**, 615, 108-E2 (1983)
- X-Ray Emission from Pre-Main-Sequence Stars, Molecular Clouds, and Star Formation. *Joseph Silk and Colin Norman*. **272**, L49, 111-A12 (1983)
- Spectral Evolution of Galaxies. I. Early-Type Systems. *Gustavo Bruzual A.* **273**, 105, 113-C6 (1983)
- Self-regulated Star Formation in the Galaxy. *José Franco and Donald P. Cox*. **273**, 243, 115-A1 (1983)
- Origins and Ages of X-Ray-Luminous Dwarf M Stars. *Hugh M. Johnson*. **273**, 702, 121-C7 (1983)
- Luminous Molecular Hydrogen Emission in the Galaxy System NGC 3690-IC 694. *J. Fischer, M. Simon, J. Benson, and P. M. Solomon*. **273**, L27, 117-C13 (1983)
- Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. *John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson*. **274**, 125, 125-C5 (1983)
- The Dynamic and Gravitational Instabilities of Spherical Shocks. *Ethan T. Vishniac*. **274**, 152, 125-E4 (1983)
- The Evolution of Massive Stars: The Numbers and Distribution of O Stars and Wolf-Rayet Stars. *Peter S. Conti, Catharine D. Garmany, C. de Loore, and D. Vanbeveren*. **274**, 302, 127-B3 (1983)
- Far-Infrared Observations of the Type I Seyfert Galaxy NGC 4051. *Howard A. Smith, Charles J. Lada, Harley A. Thronson, Jr., W. Glaccum, D. A. Harper, R. F. Loewenstein, and J. Smith*. **274**, 571, 131-E1 (1983)
- H II Regions and Star Formation in M83 and M33. *K. S. Rumstay and Michele Kaufman*. **274**, 611, 132-B3 (1983)
- The Discovery of New Embedded Sources in the Centrally Condensed Core of the Rho Ophiuchi Dark Cloud: The Formation of a Bound Cluster? *Bruce A. Wilking and Charles J. Lada*. **274**, 698, 133-A11 (1983)
- Radiatively Induced Star Formation. *T. N. LaRosa*. **274**, 815, 134-C5 (1983)
- The Birthline for Low-Mass Stars. *Steven W. Stahler*. **274**, 822, 134-C12 (1983)
- Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. *Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic*. **274**, L43, 129-D3 (1983)
- Evidence for Two Discrete Epochs of Star Formation in the Large Magellanic Cloud. *Jay A. Frogel and V. M. Blanco*. **274**, L57, 136-A13 (1983)
- Photoelectric UBV Surface Photometry of NGC 205. *Jill S. Price and Gary L. Grasdale*. **275**, 559, 143-F1 (1983)
- The Ambipolar Diffusion Time Scale and the Location of Star Formation in Magnetic Interstellar Gas Clouds. *Eugene Howard Scott*. **275**, 836, 146-F3 (1983)
- The Magnetic Flux Problem and Ambipolar Diffusion during Star Formation: One-dimensional Collapse. I. Formulation of the Problem and Method of Solution. *Efthimios V. Paleologou and Telemachos Ch. Mouschovias*. **275**, 838, 146-F5 (1983)
- Carbon Star Formation and Neutron-rich Isotope Formation in Low-Mass Asymptotic Giant Branch Stars. *Icko Iben, Jr.* **275**, L65, 148-D5 (1983)
- Strong Radio Sources in Bright Spiral Galaxies. III. Disk Emission. *J. J. Condon*. **53**, 459, 23-A1 (1983) (Abstr. in **272**, 787, 110-C12)
- The Star-forming History of the Young Cluster NGC 2264. *M. T. Adams, K. M. Strom, and S. E. Strom*. **53**, 893, 29-A11 (1983) (Abstr. in **274**, 920, 135-E1)
- Stars: High-Velocity**
- AB Stars in the Southern Galactic Halo. II. Spectroscopy and Radial Velocities. *Jeffrey R. Pier*. **53**, 791, 27-E2 (1983) (Abstr. in **274**, 922, 135-E3)
- Stars: Horizontal Branch**
- The Rotation of Horizontal-Branch Stars. I. Members of the Field. *Ruth C. Peterson, Theodore D. Tarbell, and Bruce W. Carney*. **265**, 972, 23-D6 (1983)
- Chemical Separation in Horizontal-Branch Stars. *Georges Michaud, Gérard Vauclair, and Sylvie Vauclair*. **267**, 256, 42-F4 (1983)
- The Ellipticities of Globular Clusters and the Second Parameter Problem. *John Norris*. **272**, 245, 103-F3 (1983)

- The Al I-Cyanogen Correlation in the Spectra of Globular Cluster Red Giants and the Origin of Intercluster Heavy Element Variations. *John Norris and Graeme H. Smith.* **272**, 635, 108-F8 (1983)
- The Cyanogen Distribution of the Giants in NGC 2808. *John Norris and Graeme H. Smith.* **275**, 120, 138-D1 (1983)
- The Rotation of Horizontal-Branch Stars. II. Members of the Globular Clusters M3, M5, and M13. *Ruth C. Peterson.* **275**, 737, 145-E6 (1983)
- Scanner Observations of Field Horizontal-Branch A Stars. A. G. Davis Philip and D. S. Hayes. **53**, 751, 27-A2 (1983) (Abstr. in **274**, 920, 135-E1)
- Multichannel Spectrometer Observations of Globular Cluster Horizontal-Branch A Stars. D. S. Hayes and A. G. Davis Philip. **53**, 759, 27-A10 (1983) (Abstr. in **274**, 921, 135-E2)
- AB Stars in the Southern Galactic Halo. II. Spectroscopy and Radial Velocities. *Jeffrey R. Pier.* **53**, 791, 27-E2 (1983) (Abstr. in **274**, 922, 135-E3)
- Stars: Hydrogen Deficient**
- On the Nature of Upsilon Sagittarii. *D. Schönberner and J. S. Drilling.* **268**, 225, 54-D6 (1983)
- Pulsational Constraints on the Mass and Luminosity of R Coronae Borealis Stars. *Hideyuki Saio and J. Craig Wheeler.* **272**, L25, 105-F3 (1983)
- Stars: Individual** (arranged by Constellation name, by Bright Star number, by Henry Draper number, and by Other Designation)
- By Constellation Name*
- [ $\lambda$  Andromedae] Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold.* **274**, 801, 134-B5 (1983)
- International Ultraviolet Explorer Observations of the Peculiar Variable Spectrum of the Eclipsing Binary R Arae. *George E. McCluskey and Yoji Kondo.* **266**, 755, 36-E6 (1983)
- The Correlated X-Ray and Optical Time Variability of TT Arietis. *K. A. Jensen, France A. Córdova, J. Middleditch, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer.* **270**, 211, 79-B14 (1983)
- [ $\alpha$  Aurigae] Measurement of Coronal X-Ray Emission Lines from Capella. *Peter W. Vedder and Claude R. Canizares.* **270**, 666, 85-D2 (1983)
- [ $\alpha$  Aurigae] Outer Atmospheres of Cool Stars. XIII. Capella at Critical Phases. *Thomas R. Ayres, Francis H. Schiffer III, and Jeffrey L. Linsky.* **272**, 223, 103-D9 (1983)
- [ $\alpha$  Aurigae Ab] Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold.* **274**, 801, 134-B5 (1983)
- Radial Velocity Studies of Cataclysmic Binaries. I. KR Aurigae. *Allen W. Shafter.* **267**, 222, 42-C11 (1983)
- [ $\alpha$  Bootis] Precise Radial Velocities. II. A Possible Detection of Oscillations or Running Waves in Aldebaran and Arcturus. *Myron A. Smith.* **265**, 325, 15-F2 (1983)
- [ $\tau$  Canis Majoris] Infall and Outflow of  $S^{+3}$  Ions in 15 Monocerotis, Tau Canis Majoris, and Iota Orionis. *Donald C. Morton.* **268**, 217, 54-C12 (1983)
- Episodic Mass Loss and Narrow Lines in Gamma Cassiopeiae and in Other Early-Type Stars. *H. F. Henrichs, G. Hammerschlag-Hensberge, I. D. Howarth, and P. Barr.* **268**, 807, 62-A1 (1983)
- The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae). *G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen.* **266**, 806, 37-B10 (1983)
- [ $\alpha$  Centauri] Coordinated Einstein and IUE Observations of a Disruptions Brusques Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana.* **267**, 280, 43-A1 (1983)
- [ $\alpha$  Centauri A] Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold.* **274**, 801, 134-B5 (1983)
- The Circumstellar Dust of Mu Cephei. *C. Rogers, P. G. Martin, and Dennis R. Crabtree.* **272**, 175, 103-A1 (1983)
- IUE Observations of Gas Stream Effects in the Ultraviolet Spectrum of U Cephei: Erratum. *Yoji Kondo, George E. McCluskey, and Robert E. Stencel.* **264**, 746, 10-D10 (1983) (Orig. paper in **233**, 906, 103-D11)
- Far-Ultraviolet Emission Lines in U Cephei: Evidence for a Hot, Turbulent Circumstellar Envelope. *Mirek J. Plavec.* **275**, 251, 139-F14 (1983)
- Spectroscopic and Photometric Analysis of the WN7 Eclipsing Binary CQ Cephei. *Kam-Ching Leung, Anthony F. J. Moffat, and Wilhelm Seggewiss.* **265**, 961, 23-C9 (1983)
- Secondaries of Eclipsing Binaries. V. EK Cephei. *Jocelyn Tomkin.* **271**, 717, 97-C11 (1983)
- Outer Atmospheres of Cool Stars. XIV. A Model for the Chromosphere and Transition Region of Beta Ceti (G9.5 III). *Kjell Eriksson, Jeffrey L. Linsky, and Theodore Simon.* **272**, 665, 109-A13 (1983)
- [ $\beta$  Ceti] Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold.* **274**, 801, 134-B5 (1983)
- VLBI Observations of a Radio Flare of Circinus X-1. *Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Batty, R. F. Haynes, Alan E. Wright, and George D. Nicolson.* **268**, L23, 57-B13 (1983)
- Ultraviolet Spectroscopy of V1341 Cygni (= Cygnus X-2). *L. Chiappetti, L. Maraschi, E. G. Tanzi, and A. Treves.* **265**, 354, 16-A5 (1983)
- Evidence for an  $\sim 300$  Day Period in Cygnus X-1. *W. C. Friedrichs, J. Terrell, and S. S. Holt.* **270**, 233, 79-D10 (1983)
- Constraints on the Inclination and Masses of the HDE 226868/Cygnus X-1 System from the Observations. *R. Davis and L. Hartmann.* **270**, 671, 85-D7 (1983)
- [Cygnus X-2] Ultraviolet Spectroscopy of V1341 Cygni (= Cygnus X-2). *L. Chiappetti, L. Maraschi, E. G. Tanzi, and A. Treves.* **265**, 354, 16-A5 (1983)
- The Broad-Band X-Ray Spectrum of Cygnus X-2. *Steven H. Pravdo.* **270**, 239, 79-E2 (1983)
- On the Geometrical and Kinematic Structure of the Postnova Shell of HR Delphini. *Joseph Solf.* **273**, 647, 120-F1 (1983)
- [ $\beta$  Draconis] Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold.* **274**, 801, 134-B5 (1983)
- [ $\epsilon$  Eridani] Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold.* **274**, 801, 134-B5 (1983)
- Pulsational Mode-Typing in Line Profile Variables. V. Multimodes and "Moving Shells" in  $\nu$  Eridani and Other  $\beta$  Cephei Stars. *Myron A. Smith.* **265**, 338, 15-G2 (1983)
- On the Clock Mechanism and the Implausibility of the 35 Day Precessing Disk in HZ Herculis/Hercules X-1. *Yoji Kondo, Thomas C. Van Flandern, and Charles L. Wolff.* **273**, 716, 121-D8 (1983)
- Radio Emission from AM Herculis: The Quiescent Component and an Outburst. *George A. Dulk, Timothy S. Bastien, and G. Channugam.* **273**, 249, 115-A7 (1983)

## Stars: Individual—Continued

- [DQ Herculis] Orbital Periods of Novae before Eruption. *Bradley E. Schaefer and Joseph Patterson*. **268**, 710, 61-A1 (1983)
- On the Clock Mechanism and the Implausibility of the 35 Day Precessing Disk in HZ Herculis/Hercules X-1. *Yoji Kondo, Thomas C. Van Flandern, and Charles L. Wolff*. **273**, 716, 121-D8 (1983)
- Infrared and Optical Pulsations from HZ Herculis and Possible 3.5 Second Infrared Pulsations from 1E 2259+586. *J. Middleditch, C. R. Pennypacker, and M. S. Burns*. **274**, 313, 127-B14 (1983)
- Optical Pulsations from HZ Herculis/Hercules X-1: The Self-consistent 35 Day Picture. *John Middleditch*. **275**, 278, 140-A14 (1983)
- Cessation of the 63 Second Periodicity in the Light Curve of V533 Herculis. *E. L. Robinson and R. E. Nather*. **273**, 255, 115-A13 (1983)
- First Observations of Stellar Coronal Structure: The Coronae of AR Lacertae. *Frederick M. Walter, David M. Gibson, and Gibor S. Basri*. **267**, 665, 48-A13 (1983)
- The Narrow Ultraviolet Emission Lines of the Red Dwarf AU Microscopii (dM1.6c). *Thomas R. Ayres, Kjell Eriksson, Jeffrey L. Linsky, and R. E. Stencel*. **270**, L17, 80-B4 (1983)
- Infall and Outflow of  $S^{+1}$  Ions in 15 Monocerotis, Tau Canis Majoris, and Iota Orionis. *Donald C. Morton*. **268**, 217, 54-C12 (1983)
- [BT Monocerotis] Orbital Periods of Novae before Eruption. *Bradley E. Schaefer and Joseph Patterson*. **268**, 710, 61-A1 (1983)
- Detection of High-Order Nonradial Oscillations on the Rapid Rotator Zeta Ophiuchi and Their Line with Be Type Outbursts. *Steven S. Vogt and G. Donald Penrod*. **275**, 661, 144-F14 (1983)
- Four-Color Photometry of RZ Ophiuchi and Its Accretion Disk. *Edward C. Olson and Jeffrey P. Hickey*. **264**, 251, 3-E9 (1983)
- Observations of a Hard X-Ray Component in the Spectrum of Nova Ophiuchi. *C. K. Wilson and R. E. Rothschild*. **274**, 717, 133-C2 (1983)
- Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. *Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers*. **268**, 205, 54-B14 (1983)
- [ $\epsilon$  Orionis] Infall and Outflow of  $S^{+1}$  Ions in 15 Monocerotis, Tau Canis Majoris, and Iota Orionis. *Donald C. Morton*. **268**, 217, 54-C12 (1983)
- Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. *Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers*. **268**, 205, 54-B14 (1983)
- The 1982 Ultraviolet Eclipse of the Symbiotic Binary AR Pavonis. *J. B. Hutchings, A. P. Cowley, T. B. Ake, and C. L. Imhoff*. **275**, 271, 140-A6 (1983)
- X Persei: Optical Polarization Variation on the 580 Day Binary-like Period. *James C. Kemp and Mark S. Barbour*. **264**, 237, 3-D9 (1983)
- A Search for Light-Time Effects in Binary Cepheids: AW Persei. *Nancy Remage Evans*. **272**, 214, 103-C14 (1983)
- WY Sagittae (Nova 1783): Spectroscopic Confirmation of Weaver's Candidate and Discovery of Deep Eclipses. *Michael M. Shara and Anthony F. J. Moffat*. **264**, 560, 8-D5 (1983)
- On the Nature of Upsilon Sagittarii. *D. Schönberner and J. S. Drilling*. **268**, 225, 54-D6 (1983)
- [ $\alpha$  Scorpii] Radio Emission from Antares and an Ionized Cavitation in Its Wind. *R. M. Hjellming and R. T. Newell*. **275**, 704, 154-C1 (1983)
- The Interstellar Medium near the Sun. III. Detailed Analysis of the Line of Sight to Lambda Scorpii. *Donald G. York*. **264**, 172, 2-F12 (1983)
- [ $\alpha$  Tauri] Precise Radial Velocities. II. A Possible Detection of Oscillations or Running Waves in Aldebaran and Arcturus. *Myron A. Smith*. **265**, 325, 15-F2 (1983)
- Lambda Tauri: A Probe of Angular Momentum Loss in Algol Binaries. *Charles D. Bailyn and Peter P. Eggleton*. **274**, 763, 133-F6 (1983)
- RW Tauri as a Weak W Serpente Star. *Mirek J. Plavec and Jan J. Dobias*. **272**, 206, 103-C6 (1983)
- Spectral Energy Distributions of Young Stellar Objects. I. A Turbospheric Model for DR Tauri. *Roger K. Ulrich, Allen W. Shafter, George Hawkins, and Gillian Knapp*. **267**, 199, 42-B2 (1983)
- Detection of Flarelike Events and Their Relationship to Presumed Spot Regions of V471 Tauri: A Solar-Stellar Connection. *Arthur Young, A. Klimke, John L. Africano, Rob Quigley, Richard R. Radick, and Dave Van Buren*. **267**, 655, 48-A3 (1983)
- Spectroscopy of V711 Tauri (= HR 1099): Fundamental Properties and Evidence for Starspots. *Francis C. Fekel, Jr.* **268**, 274, 55-A1 (1983)
- [RR Telescopii] Broad Emission Features in QSOs and Active Galactic Nuclei. I. New Calculations of Fe II Line Strengths. *Hagai Netzer and Beverley J. Wills*. **275**, 445, 142-D4 (1983)
- Time-resolved Spectrophotometry of the Nova-like Variable RW Trianguli. *Ronald H. Kaitchuck, R. Kent Honeycutt, and Eric M. Schlegel*. **267**, 239, 42-E1 (1983)
- Stellar Images Derived from Rotation Broadening: AW Ursae Majoris. *Lawrence Anderson, Darryl Stanford, and Douglas Leininger*. **270**, 200, 79-B3 (1983)
- A New Look at BE Ursae Majoris. *D. Crampton, A. P. Cowley, and J. B. Hutchings*. **272**, 202, 103-C2 (1983)
- [ $\alpha$  Ursae Minoris] Period and Amplitude Variations of Polaris. *A. Arellano Ferro*. **274**, 755, 133-E12 (1983)
- Time-resolved Spectrophotometry of the Nova-like Variable US Ursae Majoris. *Eric M. Schlegel, R. Kent Honeycutt, and Ronald H. Kaitchuck*. **53**, 397, 22-A5 (1983) (Abstr. in **272**, 786, 110-C11)

## By Bright Star Number

Heavy-Element Abundances in the Classical Barium Star HR 774. *Jocelyn Tomkin and David L. Lambert*. **273**, 722, 121-D14 (1983)

Spectroscopy of V711 Tauri (= HR 1099): Fundamental Properties and Evidence for Starspots. *Francis C. Fekel, Jr.* **268**, 274, 55-A1 (1983)

HR 7578: A K Dwarf Double-lined Spectroscopic Binary with Peculiar Abundances. *Francis C. Fekel, Jr. and W. I. Beavers*. **267**, 682, 48-C2 (1983)

## By Henry Draper Number

Ultraviolet Interstellar Absorption toward HD 5980 in the Small Magellanic Cloud. *Edward L. Fitzpatrick and Blair D. Savage*. **267**, 93, 41-A6 (1983)

Interstellar Absorption toward HD 14633. *L. M. Hobbs*. **265**, 817, 21-F3 (1983)

The  $C_2H$ ,  $C_2$ , and CN Electronic Absorption Bands in the Carbon Star HD 19557. *J. H. Goebel, J. D. Bregman, D. M. Cooper, D. Goorvitch, S. R. Langhoff, and F. C. Witteborn*. **270**, 190, 79-A7 (1983)

The Extreme LMC Supergiant HD 38489: An Optical and Ultraviolet Study. *Steven N. Shore and N. Sanduleak*. **273**, 177, 114-B8 (1983)

Molecular Emission Bands in the Ultraviolet Spectrum of the Red Rectangle Star HD 44179. *Michael L. Sioko*. **265**, 848, 22-A10 (1983)

Infrared Spectra of WN Stars. I. HD 50896. *D. J. Hillier, T. J. Jones, and A. R. Hyland*. **271**, 221, 90-D9 (1983)

The Massive WC6+O6-8 Spectroscopic Binary HD 94305. *Virpi S. Niemela, Roberto H. Méndez, and Anthony F. J.*



*Moffat*. **272**, 190, 103-B2 (1983)

Identification of the Emission Features near 3.5 Microns in the Pre-Main-Sequence Star HD 97048. *F. Baas, L. J. Allamandola, T. R. Geballe, S. E. Persson, and J. H. Lacy*. **265**, 290, 15-C8 (1983)

Element Identifications in the Ultraviolet Spectrum of HD 101065. *G. Wegner, D. J. Cummins, P. B. Byrne, and D. J. Stickland*. **272**, 646, 108-G5 (1983)

The R- and s-Process Nuclei in the Early History of the Galaxy: HD 122563. *Christopher Sneden and M. Parthasarathy*. **267**, 757, 49-A11 (1983)

[HD 147889] The Ionization Equilibrium inside the Rho Ophiuchi Cloud. *Theodore P. Snow, Jr.* **266**, 576, 34-E6 (1983)

The X-Ray Absorption Spectrum of 4U 1700-37 and Its Implications for the Stellar Wind of the Companion HD 153919. *N. E. White, T. R. Kallman, and J. H. Swank*. **269**, 264, 68-A13 (1983)

Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. *M. Garcia, S. L. Baliunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson*. **267**, 291, 43-A13 (1983)

Pulsation Mode Switching in HD 161796. *J. D. Fernie*. **265**, 999, 23-F5 (1983)

HD 164615: A Probable Spotted Single F Type Star. *Helmut A. Abt, Galen Bollinger, and Edward W. Burke, Jr.* **272**, 196, 103-B10 (1983)

Rapid Rotation and Stellar Activity in the Triple System HD 165590. *Robert A. Stern and Andrew Skumanich*. **267**, 232, 42-D8 (1983)

Constraints on the Inclination and Masses of the HDE 226868/Cygnus X-1 System from the Observations. *R. Davis and L. Hartmann*. **270**, 671, 85-D7 (1983)

#### By Other Designation

Identification of CW 1103+254 as a New Magnetic Variable. *H. S. Stockman, C. B. Foltz, G. D. Schmidt, and S. Tapia*. **271**, 725, 97-D5 (1983)

Magnetism in the AM Herculis Variable CW 1103+254. *Gary D. Schmidt, H. S. Stockman, and Steven A. Grandi*. **271**, 735, 97-E1 (1983)

Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. *K. O. Mason, J. Middleitch, F. A. Cordova, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer*. **264**, 575, 8-E6 (1983)

Iron and Magnesium in the White Dwarf GD 40: A Test of Diffusion Theory. *Harry L. Shipman and Jesse L. Greenstein*. **266**, 761, 36-E12 (1983)

The Light Curve of the ZZ Ceti Star G226-29. *S. O. Kepler, E. L. Robinson, and R. E. Nather*. **271**, 744, 97-E11 (1983)

G74-7: A True DA,F (DAZ) White Dwarf. *P. Lacombe, James Liebert, F. Wesemael, and G. Fontaine*. **272**, 660, 109-A8 (1983)

Outer Atmospheres of Cool Stars. XIV. A Model for the Chromosphere and Transition Region of Beta Ceti (G9.5 III). *Kjell Eriksson, Jeffrey L. Linsky, and Theodore Simon*. **272**, 665, 109-A13 (1983)

The Dust around the Carbon Star IKC + 10216. *M. Jura*. **267**, 647, 47-G8 (1983)

The Peculiar Cool White Dwarf LHS 1126: A Different Interpretation. *James Liebert and Conrad C. Dahn*. **269**, 258, 68-A7 (1983)

LHS 2924: A Uniquely Cool Low-Luminosity Star with a Peculiar Energy Distribution. *Ronald G. Probst and James Liebert*. **274**, 245, 126-D13 (1983)

X-Ray Properties of the Be/X-Ray System 2S 0114+650 = LSI +65°010. *G. Koenigsberger, J. H. Swank, A. E. Szymkowiak, and N. E. White*. **268**, 782, 61-F4 (1983)

WY Sagittae (Nova 1783): Spectroscopic Confirmation of

Weaver's Candidate and Discovery of Deep Eclipses. *Michael M. Shara and Anthony F. J. Moffat*. **264**, 560, 8-D5 (1983)

Infrared Observations of R136, the Central Object of the 30 Doradus Nebula. *Nino Panagia, Enrico G. Tanzi, and Massimo Tarenghi*. **272**, 123, 102-D4 (1983)

Narrow-Band Photometric Periods in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi*. **269**, 605, 73-A11 (1983)

The X-Ray Lobes of SS 433. *M. G. Watson, R. Willingale, J. E. Grindlay, and F. D. Seward*. **273**, 688, 121-B6 (1983)

Precession Instability in SS 433. *Scott F. Anderson, Bruce Margon, and Steven A. Grandi*. **273**, 697, 121-C2 (1983)

SS 433: Improved Evidence for a Persistent 160 Day Photometric Period. *Gary D. Henson, James C. Kemp, Mark S. Barbour, Daniel J. Kraus, Elia M. Leibowitz, and Tsevi Mazeh*. **275**, 247, 139-F10 (1983)

The Cool DC White Dwarf Stein 2051B. *Gary Wegner and F. H. Yackovich*. **275**, 240, 139-F3 (1983)

Infrared and Optical Pulsations from HZ Herculis and Possible 3.5 Second Infrared Pulsations from 1E 2259+586. *J. Middleitch, C. R. Pennypacker, and M. S. Burns*. **274**, 313, 127-B14 (1983)

X-Ray Properties of the Be/X-Ray System 2S 0114+650 = LSI +65°010. *G. Koenigsberger, J. H. Swank, A. E. Szymkowiak, and N. E. White*. **268**, 782, 61-F4 (1983)

The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae). *G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen*. **266**, 806, 37-B10 (1983)

X-Ray Observations of 4U 1626-67 by the Monitor Counter on the Einstein (HEAO 2) Observatory. *R. F. Elsner, W. Darbro, D. Leahy, M. C. Weisskopf, P. G. Sutherland, S. M. Kahn, and J. E. Grindlay*. **266**, 769, 36-F6 (1983)

#### Stars: Interiors

The Ages and Compositions of Old Clusters. *Kenneth Janes and Pierre Demarque*. **264**, 206, 3-B6 (1983)

Evolutionary Effects of Helium Diffusion in Population II Stars. *Guy S. Stringfellow, Peter Bodenheimer, Peter D. Noerdlinger, and Richard J. Arigo*. **264**, 228, 3-C14 (1983)

Meridional Circulation of Rotating Stars. IV. The Approach to the Mean Steady State in Early-Type Stars. *Jean-Louis Tassoul and Monique Tassoul*. **264**, 298, 4-B3 (1983)

Possible Mechanisms for the Hubble-Sandage (S Doradus) Variables. *Richard Stothers and Chao-wen Chin*. **264**, 583, 8-F2 (1983)

On the Evolution of Those Nuclei of Planetary Nebulae That Experience a Final Helium Shell Flash. *Icko Iben, Jr., James B. Kaler, James W. Truran, and Alvio Renzini*. **264**, 605, 9-A1 (1983)

Masses, Radii, and Magnetic Fields of Pulsating X-Ray Sources: Is the "Standard" Model Self-consistent? *Ira Wasserman and Stuart L. Shapiro*. **265**, 1036, 24-B2 (1983)

Self-similar Stellar Collapse. *Amos Yahil*. **265**, 1047, 24-B13 (1983)

Studies of Late-Type Dwarfs. V. Theoretical Models for Lower Main-Sequence Stars. *Don A. Vandenberg, F. D. A. Hartwick, P. Dawson, and David R. Alexander*. **266**, 747, 36-D12 (1983)

The Light and Velocity Curves of Classical Cepheids: Theory versus Observation. *Norman R. Simon and Cecil G. Davis*. **266**, 787, 37-A1 (1983)

Chemical Separation in Horizontal-Branch Stars. *Georges Michaud, Gérard Vauclair, and Sylvie Vauclair*. **267**, 256, 42-F4 (1983)

Models of X-Ray Bursters with Radius Expansion. *Bohdan Paczyński*. **267**, 315, 43-C11 (1983)

Meridional Circulation in Rotating Stars. V. Cooling White Dwarfs. *Monique Tassoul and Jean-Louis Tassoul*. **267**, 334, 43-E2 (1983)

## Stars: Interiors—Continued

- QUIPS: Time-dependent Properties of Quasi-invariant Self-gravitating Polytropes. *A. Munier and M. R. Feix.* **267**, 344, 43-E12 (1983)
- On the Stability of Rotating Stellar Models in General Relativity Theory. *Lee Lindblom and William A. Hiscock.* **267**, 384, 44-A10 (1983)
- Necessary Conditions for the Stability of Rotating Newtonian Stellar Models. *Lee Lindblom.* **267**, 402, 44-B14 (1983)
- Radioactive Models of Type I Supernovae. *Stuart R. Schurmann.* **267**, 779, 49-C10 (1983)
- Multiscale Model Equations for Turbulent Convection and Convective Overshoot. *Philip S. Marcus, William H. Press, and Saul A. Teukolsky.* **267**, 795, 49-D12 (1983)
- Differential Rotation in F Stars: A Comparison between Theory and Observation. *G. Belvedere and L. Paternò.* **268**, 246, 54-E13 (1983)
- The Luminosity—Core Mass Relation: Why and How. *Y. Tuchman, A. Glasner, and Z. Barkat.* **268**, 356, 55-G1 (1983)
- The Discovery of Nonradial Instability Strips for Hot, Evolved Stars. *Sumner G. Starfield, Arthur N. Cox, Stephen W. Hodson, and W. D. Pesnell.* **268**, L27, 57-C3 (1983)
- Diffusion, Meridional Circulation, and Mass Loss in Fm-Am Stars. *Georges Michaud, David Tarasick, Yves Charland, and Claude Pelletier.* **269**, 239, 67-F14 (1983)
- A Two-dimensional Supernova Model with Rotation and Nuclear Burning. *Peter Bodenheimer and S. E. Woosley.* **269**, 281, 68-C3 (1983)
- Theoretical Radial Pulsation Analyses of DA White Dwarfs. *Sumner Starfield, Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy.* **269**, 645, 73-D14 (1983)
- On the Large-Scale Dynamics of Rapidly Rotating Convection Zones. *B. P. Durney.* **269**, 671, 73-F14 (1983)
- A Survey of the Core Helium Flash with Dynamic Convection. *Robert G. Deupree and Peter W. Cole.* **269**, 676, 73-G5 (1983)
- A Comparison between Observed and Theoretical H-R Diagrams for the Young LMC Star Cluster NGC 1866. *Stephen A. Becker and Grant J. Mathews.* **270**, 155, 78-E12 (1983)
- The Evolution of Large Planetary Nebulae and Their Central Stars. *James B. Kaler.* **271**, 188, 90-A9 (1983)
- Meridional Circulation in Rotating Stars. VI. The Effects of Anisotropic Eddy Viscosity. *Monique Tassoul and Jean-Louis Tassoul.* **271**, 315, 91-D6 (1983)
- Lithium Abundance and Age Spread in the Pleiades. *Douglas K. Duncan and Burton F. Jones.* **271**, 663, 96-F9 (1983)
- Long-Period Variables in the Magellanic Clouds: Supergiants, AGB Stars, Supernova Precursors, Planetary Nebula Precursors, and Enrichment of the Interstellar Medium. *P. R. Wood, M. S. Bessell, and M. W. Fox.* **272**, 99, 102-B8 (1983)
- On the Evolution of Massive Zero-Metal Stars. V. Castellani, A. Chieffi, and A. Tornambé. **272**, 249, 103-F7 (1983)
- Structure of Neutron Star Envelopes. E. H. Gudmundsson, C. J. Pethick, and R. I. Epstein. **272**, 286, 104-B2 (1983)
- Late Stages of Stellar Evolution. II. Mass Loss and the Transition of Asymptotic Giant Branch Stars into Hot Remnants. *Detlef Schönberner.* **272**, 708, 109-E2 (1983)
- Collapse and Explosion of White Dwarfs. I. Precollapse Evolution. *J. Isern, J. Labay, M. Hernanz, and R. Canal.* **273**, 320, 115-F8 (1983)
- Temperature-Grid Coordinates for Treating Pulsations in the Hydrogen Ionization Zone. *Toshiki Aikawa and Norman R. Simon.* **273**, 346, 116-A11 (1983)
- The Nature of R136a, the Superluminous Central Object of the 30 Doradus Nebula. *Blair D. Savage, Edward L. Fitzpatrick, Joseph P. Cassinelli, and Dennis C. Ebbets.* **273**, 597, 120-B1 (1983)
- On Tidal Detonation of Stars by Massive Black Holes. *G. V. Bicknell and R. A. Gingold.* **273**, 749, 121-F13 (1983)
- Effects of Core Perturbations on the Structure of the Sun.

*Allen V. Sweigart.* **273**, 795, 122-C4 (1983)

Carbon Star Formation and Neutron-rich Isotope Formation in Low-Mass Asymptotic Giant Branch Stars. *Icko Iben, Jr.* **275**, L65, 148-D5 (1983)

Star Clusters and Stellar Evolution. I. Improved Synthetic Color-Magnitude Diagrams for the Oldest Clusters. *Don A. Vandenberg.* **51**, 29, 1-D1 (1983) (Abstr. in **263**, 1006, 142-F7)

## Stars: Late-Type

The Cyanogen Distribution of the Red Giants in M5. *Graeme H. Smith and John Norris.* **264**, 215, 3-C1 (1983)

H $\alpha$  Emission and Mass Loss from Metal-poor Giants. *Raffaele G. Gratton.* **264**, 223, 3-C9 (1983)

Molecular Self-Shielding in the Outflows from Late-Type Stars. *M. Morris and M. Jura.* **264**, 546, 8-C5 (1983)

A Giant X-Ray Flare in the Hyades. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos.* **264**, L55, 11-B11 (1983)

Carbon and Nitrogen Abundances in Giant Stars of the Metal-poor Globular Cluster M15. *Charles F. Trefzger, Duane F. Carbon, G. E. Langer, Nicholas B. Suntzeff, and Robert P. Kraft.* **266**, 144, 28-E6 (1983)

Kinematics of the Late M Stars in the Galactic Nuclear Bulge. *J. R. Mould.* **266**, 255, 29-F6 (1983)

The H I Content of Envelopes around Evolved Stars. *G. R. Knapp and P. F. Bowers.* **266**, 701, 36-A5 (1983)

Studies of Late-Type Dwarfs. V. Theoretical Models for Lower Main-Sequence Stars. *Don A. Vandenberg, F. D. A. Hartwick, P. Dawson, and David R. Alexander.* **266**, 747, 36-D12 (1983)

Periodic Light Variations in Four Pre-Main-Sequence K Stars. *A. E. Rydgren and F. J. Vrba.* **267**, 191, 42-A8 (1983)

Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. *M. Garcia, S. L. Balinas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson.* **267**, 291, 43-A13 (1983)

An H $\alpha$  Survey of Southern Hemisphere Active Chromosphere Stars. *Bernard W. Bopp and J. B. Hearnshaw.* **267**, 653, 48-A1 (1983)

HR 7578: A K Dwarf Double-lined Spectroscopic Binary with Peculiar Abundances. *Francis C. Fekel, Jr. and W. I. Beavers.* **267**, 682, 48-C2 (1983)

Survey of H $\alpha$  Emission in Globular Cluster Red Giants. *C. Cacciari and K. C. Freeman.* **268**, 185, 54-A7 (1983)

Rotational Studies of Late-Type Stars. III. Rotation among BY Draconis Stars. *Steven S. Vogt, David R. Soderblom, and G. Donald Penrod.* **269**, 250, 67-G11 (1983)

Nucleosynthesis of  $^{26}\text{Al}$  at Low Stellar Temperatures. *A. E. Champagne, A. J. Howard, and P. D. Parker.* **269**, 686, 74-A1 (1983)

Abundances in Globular Cluster Red Giants. V. The Metal-rich Globular Clusters. *Judith G. Cohen.* **270**, 654, 85-C4 (1983)

The Evolution of a Stripped Giant—Neutron Star Binary. *Ronald E. Taam.* **270**, 694, 85-F4 (1983)

The Detection of H $_2$  in Cool Carbon Stars. *H. R. Johnson, J. H. Goebel, D. Goorvitch, and S. T. Ridgway.* **270**, L63, 87-C9 (1983)

Chromospheric and Coronal Emissions from the Giants in the Hyades. *S. L. Balinas, L. Hartmann, and A. K. Dupree.* **271**, 672, 96-G4 (1983)

Stationary Flows in the Circumstellar Envelopes of M Giants. *A. G. G. M. Tielens.* **271**, 702, 97-B10 (1983)

Nickel Overabundances in Extremely Metal-deficient Red Giants. *R. Earle Luck and Howard E. Bond.* **271**, L75, 100-C3 (1983)

The Circumstellar Dust of Mu Cephei. *C. Rogers, P. G. Martin, and Dennis R. Crabtree.* **272**, 175, 103-A1 (1983)

- Outer Atmospheres of Cool Stars. XIII. Capella at Critical Phases. *Thomas R. Ayres, Francis H. Schiffer III, and Jeffrey L. Linsky.* **272**, 223, 103-D9 (1983)
- Some Constraints on the Color-Magnitude Diagram of Giants in the Galactic Spheroid. *John N. Bahcall, Raymond M. Soneira, Donald C. Morton, and K. P. Tritton.* **272**, 627, 108-E14 (1983)
- The Al i-Cyanogen Correlation in the Spectra of Globular Cluster Red Giants and the Origin of Intercluster Heavy Element Variations. *John Norris and Graeme H. Smith.* **272**, 635, 108-F8 (1983)
- Outer Atmospheres of Cool Stars. XIV. A Model for the Chromosphere and Transition Region of Beta Ceti (G9.5 III). *Kjell Eriksson, Jeffrey L. Linsky, and Theodore Simon.* **272**, 665, 109-A13 (1983)
- Bright, Rapid, Highly Polarized Radio Spikes from the M Dwarf AD Leonis. *Kenneth R. Lang, Jay Bookbinder, Leon Golub, and Michael M. Davis.* **272**, L15, 105-E8 (1983)
- The Formation of Emission Lines in the Expanding Chromospheres of Luminous Cool Stars. I. The Importance of Atmospheric Extension and Partial Redistribution Effects. *S. A. Drake and J. L. Linsky.* **273**, 299, 115-E1 (1983)
- Origins and Ages of X-Ray-Luminous Dwarf M Stars. *Hugh M. Johnson.* **273**, 702, 121-C7 (1983)
- Quantitative Technetium and Niobium Abundances in Heavy-Element Stars. *Verne V. Smith and George Wallerstein.* **273**, 742, 121-F6 (1983)
- LHS 2924: A Uniquely Cool Low-Luminosity Star with a Peculiar Energy Distribution. *Ronald G. Probst and James Liebert.* **274**, 245, 126-D13 (1983)
- The Circumstellar Envelopes and Chromospheres of Cool Giants and Supergiants. *Wendy Hagen, Robert E. Stencel, and Dale F. Dickinson.* **274**, 286, 127-A1 (1983)
- Metal Content of K Giants in the Nuclear Bulge of the Galaxy. *A. E. Whitford and R. M. Rich.* **274**, 723, 133-C8 (1983)
- Circumstellar Envelope Structure of Late-Type Stars. *P. F. Bowers, K. J. Johnston, and J. H. Spencer.* **274**, 733, 133-D4 (1983)
- Microwave Emission from the Coronae of Late-Type Dwarf Stars. *Jeffrey L. Linsky and Dale E. Gary.* **274**, 776, 133-G5 (1983)
- Outer Atmospheres of Cool Stars. XV. High-Dispersion Ultraviolet Studies of Active Chromosphere G-K Dwarfs. *Thomas R. Ayres, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, and Alexander Brown.* **274**, 784, 134-A1 (1983)
- Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold.* **274**, 801, 134-B5 (1983)
- Rapid Rotation among Pleiades K Dwarfs. *David R. Soderblom, Burton F. Jones, and Merle F. Walker.* **274**, L37, 129-C12 (1983)
- First Detection of Winds in Red Giants by Microwave Continuum Techniques. *S. A. Drake and J. L. Linsky.* **274**, L77, 136-C3 (1983)
- An Infrared Search for Luminous Stars in the Bar West Field of the Large Magellanic Cloud. *Jay A. Frogel and Harvey B. Richer.* **275**, 84, 138-A1 (1983)
- Mass Loss from Evolved Stars. II. Radio Continuum Emission and Evolution to Planetary Nebulae. *D. N. Spergel, J. L. Giuliani, Jr., and G. R. Knapp.* **275**, 330, 140-E10 (1983)
- Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Baliunas, Arthur H. Vaughan, Lee Hartmann, Frans Middekoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning.* **275**, 752, 145-F7 (1983)
- Globular Cluster Giant Branches and the Metallicity Scale. *Jay A. Frogel, Judith G. Cohen, and S. E. Persson.* **275**, 773, 146-A9 (1983)
- X-Ray Emission of Late-Type Stars. *L. Paternò and F. Zuccarello.* **275**, L1, 141-F2 (1983)
- A Giant X-Ray Flare in the Hyades: Erratum. *Robert A. Stern, James H. Underwood, and Spiro K. Antiochos.* **275**, L25, 141-G9 (1983) (Orig. paper in **264**, L55, 11-B11)
- The Chemical Composition of Stars in Globular Clusters. *Catherine A. Pilachowski, Christopher Sneden, and George Wallerstein.* **52**, 241, 12-G9 (1983) (Abstr. in **269**, 810, 75-C9)
- Rotational Studies of Late-Type Stars. II. Ages of Solar-Type Stars and the Rotational History of the Sun. *David R. Soderblom.* **53**, 1, 17-A3 (1983) (Abstr. in **271**, 889, 99-B11)
- An Infrared Search for Very Low Mass Stars: JHK Photometry and Results for Composite Systems. *Ronald G. Probst.* **53**, 335, 21-D2 (1983) (Abstr. in **272**, 785, 110-C10)
- Ultraviolet and Optical Studies of Binaries with Luminous Cool Primaries and Hot Companions. III. Reticon Radial Velocities. *Sidney B. Parsons.* **53**, 553, 24-E1 (1983) (Abstr. in **273**, 839, 122-F9)
- Predicted Infrared Brightness of Stars within 25 Parsecs of the Sun. *Hugh M. Johnson and Christine D. Wright.* **53**, 643, 25-D8 (1983) (Abstr. in **273**, 840, 122-F10)
- Infrared Photometry, Bolometric Luminosities, and Effective Temperatures for Giant Stars in 26 Globular Clusters. *Jay A. Frogel, S. E. Persson, and Judith G. Cohen.* **53**, 713, 26-B9 (1983) (Abstr. in **273**, 841, 122-F11)
- Stars: Long-Period Variables**
- Long-Period Variables in the Galactic Bulge: Evidence for a Young Super-Metal-rich Population. *P. R. Wood and M. S. Bessell.* **265**, 748, 21-A1 (1983)
- Detection of  $J = 5-4$  SiO Masers in Late-Type Stars. *Dan P. Clemens and Adair P. Lane.* **266**, L117, 39-D5 (1983)
- High Spatial Resolution VLA Observations of the R Aquarii Jet. *M. Kafatos, J. M. Hollis, and A. G. Michalitsianos.* **267**, L103, 51-C7 (1983)
- Stationary Flows in the Circumstellar Envelopes of M Giants. *A. G. G. M. Tielens.* **271**, 702, 97-B10 (1983)
- Long-Period Variables in the Magellanic Clouds: Supergiants, AGB Stars, Supernova Precursors, Planetary Nebula Precursors, and Enrichment of the Interstellar Medium. *P. R. Wood, M. S. Bessell, and M. W. Fox.* **272**, 99, 102-B8 (1983)
- A Comment on Red Supergiant Variables in the SMC. *Jay A. Frogel.* **272**, 116, 102-C11 (1983)
- The Evolutionary State and Pulsation Characteristics of Red Variables in Globular Clusters. *Jay A. Frogel.* **272**, 167, 102-G6 (1983)
- OH/IR Masers. IV. Evolution, Pulsation, and Nature of the Sources. *Terry J. Jones, A. R. Hyland, P. R. Wood, and Ian Gatley.* **273**, 669, 121-A1 (1983)
- Circumstellar Envelope Structure of Late-Type Stars. *P. F. Bowers, K. J. Johnston, and J. H. Spencer.* **274**, 733, 133-D4 (1983)
- Kinematics and Ages of Mira Variables in the Greater Solar Neighborhood. *S. P. Wyatt and J. H. Cahn.* **275**, 225, 139-E2 (1983)
- Stars: Luminosities**
- Wolf-Rayet Stars in the LMC: How Faint Are the Faintest? *Philip Massey and Peter S. Conti.* **264**, 126, 2-C8 (1983)
- A Comment on "A Comparative Study of Rotational Properties of High-Velocity and Low-Velocity Early-Type Stars". *Nolan R. Walborn.* **267**, L59, 45-F4 (1983)
- Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart.* **267**, L89, 51-B7 (1983)
- The Brightest Stars as Extragalactic Distance Indicators. *Robert M. Humphreys.* **269**, 335, 70-A5 (1983)

**Stars: Luminosities—Continued**

- The Near-Infrared Cepheid Distance Scale. I. Preliminary Galactic Calibration. *R. McGonegal, C. W. McAlary, R. A. McLaren, and B. F. Madore.* **269**, 641, 73-D10 (1983)
- Cepheids in Open Clusters and Associations. *J. D. Fernie and R. McGonegal.* **275**, 732, 145-E1 (1983)
- Luminosity and Motion of Large Proper Motion Stars. II. Stars with Annual Proper Motion Larger than 0.7 Arc Seconds. *Olin J. Eggen.* **51**, 183, 4-A2 (1983) (Abstr. in **264**, 747, 10-D11)
- Infrared Photometry, Bolometric Luminosities, and Effective Temperatures for Giant Stars in 26 Globular Clusters. *Jay A. Frogel, S. E. Persson, and Judith G. Cohen.* **53**, 713, 26-B9 (1983) (Abstr. in **273**, 841, 122-F11)

**Stars: Magnetic**

- Two Hot, Low-Field Magnetic DA White Dwarfs. *James Liebert, Gary D. Schmidt, Richard F. Green, H. S. Stockman, and John T. McGraw.* **264**, 262, 3-F7 (1983)
- Optical Identification of the X-Ray Source E1405–451: A 101.5 Minute Binary System with Extremely Rapid Quasiperiodic Variability. *K. O. Mason, J. Middleditch, F. A. Cordova, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer.* **264**, 575, 8-E6 (1983)
- Mass Loss from Rotating Magnetic Stars: Weber and Davis Re-revisited. *K. B. MacGregor and V. J. Pizzo.* **267**, 340, 43-E8 (1983)
- Absorption of Radiation Propagating Obliquely in a Magnetoplasma. *A. Khandker, R. F. O'Connell, and G. W. Ford.* **269**, 668, 73-F11 (1983)
- Magnetic Bubbles and High-Velocity Outflows in Molecular Clouds. *B. T. Draine.* **270**, 519, 82-G6 (1983)
- Identification of CW 1103+254 as a New Magnetic Variable. *H. S. Stockman, C. B. Foltz, G. D. Schmidt, and S. Tapia.* **271**, 725, 97-D5 (1983)
- Magnetism in the AM Herculis Variable CW 1103+254. *Gary D. Schmidt, H. S. Stockman, and Steven A. Grandi.* **271**, 735, 97-E1 (1983)
- Radio Emission from AM Herculis: The Quiescent Component and an Outburst. *George A. Dulk, Timothy S. Bastien, and G. Channugam.* **273**, 249, 115-A7 (1983)
- Microwave Emission from the Coronae of Late-Type Dwarf Stars. *Jeffrey L. Linsky and Dale E. Gary.* **274**, 776, 133-G5 (1983)
- Synchronization of Magnetic Stars in Binary Systems. *F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb.* **274**, L71, 136-B12 (1983)
- Linear Polarization Measurements of the AM Herculis Objects H0139–68 and E1405–451. *N. Visvanathan and I. Tuohy.* **275**, 709, 145-C6 (1983)
- A New Technique for Calculations of Binary Stellar Evolution, with Application to Magnetic Braking. *S. Rappaport, F. Verbunt, and P. C. Joss.* **275**, 713, 145-C10 (1983)
- Magnetic Overstability as an Excitation Mechanism of the Rapid Oscillations of Ap Stars. *Hiromoto Shibahashi.* **275**, L5, 141-F6 (1983)
- The Magnetic Fields of the Helium-weak B Stars. *Ermanno F. Borra, J. D. Landstreet, and Ian Thompson.* **53**, 151, 18-D13 (1983) (Abstr. in **271**, 894, 99-C2)

**Stars: Massive**

- Infrared Observations of R136, the Central Object of the 30 Doradus Nebula. *Nino Panagia, Enrico G. Tanzi, and Massimo Tarenghi.* **272**, 123, 102-D4 (1983)
- On the Evolution of Massive Zero-Metal Stars. *V. Castellani, A. Chieffi, and A. Tornambe.* **272**, 249, 103-F7 (1983)
- The Evolution of Massive Stars: The Numbers and Distribution of O Stars and Wolf-Rayet Stars. *Peter S. Conti, Catharine D. Garmany, C. de Loore, and D. Vanbeveren.* **274**, 302, 127-B3 (1983)
- IUE Observations of the Exciting Stars of Giant H II Regions

in M33: Supermassive Stars? *Philip Massey and J. B. Hutchings.* **275**, 578, 143-G9 (1983)

Massive Eclipsing Binary Candidates. *R. F. Garrison, R. E. Schild, and W. A. Hiltner.* **52**, 1, 9-A2 (1983) (Abstr. in **267**, 892, 50-D14)

**Stars: Mass Loss**

- H $\alpha$  Emission and Mass Loss from Metal-poor Giants. *Raffaella G. Gratton.* **264**, 223, 3-C9 (1983)
- Molecular Self-Shielding in the Outflows from Late-Type Stars. *M. Morris and M. Jura.* **264**, 546, 8-C5 (1983)
- An Alternative Model for the Atmospheres of Wolf-Rayet and O Stars. *Anne B. Underhill.* **265**, 933, 23-A9 (1983)
- The H I Content of Envelopes around Evolved Stars. *G. R. Knapp and P. F. Bowers.* **266**, 701, 36-A5 (1983)
- The Angular Diameters, Effective Temperatures, Radii, and Luminosities of 10 Wolf-Rayet Stars. *Anne B. Underhill.* **266**, 718, 36-B10 (1983)
- Mass Loss in HR 1040 (A0 Ia): Analysis of Mg II  $\lambda$ 2802 and H $\alpha$ . *Paul B. Kunasz, Nancy D. Morrison, and B. Spessart.* **266**, 739, 36-D4 (1983)
- Spectral Energy Distributions of Young Stellar Objects. I. A Turbospheric Model for DR Tauri. *Roger K. Ulrich, Allen W. Shafter, George Hawkins, and Gillian Knapp.* **267**, 199, 42-B2 (1983)
- The Effect of Sudden Mass Loss and a Random Kick Velocity Produced in a Supernova Explosion on the Dynamics of a Binary Star of Arbitrary Orbital Eccentricity. Applications to X-Ray Binaries and to the Binary Pulsars. *J. G. Hills.* **267**, 322, 43-D4 (1983)
- Mass Loss from Rotating Magnetic Stars: Weber and Davis Re-revisited. *K. B. MacGregor and V. J. Pizzo.* **267**, 340, 43-E8 (1983)
- Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart.* **267**, L89, 51-B7 (1983)
- High Spatial Resolution VLA Observations of the R Aquarii Jet. *M. Kafatos, J. M. Hollis, and A. G. Michalitsianos.* **267**, L103, 51-C7 (1983)
- Survey of H $\alpha$  Emission in Globular Cluster Red Giants. *C. Cacciari and K. C. Freeman.* **268**, 185, 54-A7 (1983)
- Angular Momentum Loss and the Evolution of Cataclysmic Binaries. *Ronald E. Taam.* **268**, 361, 55-G6 (1983)
- Stellar Winds and Molecular Clouds: T Tauri Stars. *Nuria Calvet, Jorge Cantó, and L. F. Rodríguez.* **268**, 739, 61-C3 (1983)
- HH 1 and HH 2: The Results of an Eruptive Event in the Cohen-Schwartz Star? *Reinhard Mundt and Lee Hartmann.* **268**, 766, 61-E2 (1983)
- Episodic Mass Loss and Narrow Lines in Gamma Cassiopeiae and in Other Early-Type Stars. *H. F. Henrichs, G. Hamerschlag-Hensberge, I. D. Howarth, and P. Barr.* **268**, 807, 62-A1 (1983)
- Diffusion, Meridional Circulation, and Mass Loss in Fm-Am Stars. *Georges Michaud, David Tarasick, Yves Charland, and Claude Pelletier.* **269**, 239, 67-F14 (1983)
- Infrared Photometry and Mass Loss Rates for Of-Type Stars. *Paolo Persi, Marco Ferrari-Toniolo, and Gary L. Grasdale.* **269**, 625, 73-C5 (1983)
- Mass Loss, Levitation, Accretion, and the Sharp-Lined Features in Hot White Dwarfs. *Frederick C. Bruhweiler and Yoji Kondo.* **269**, 657, 73-E14 (1983)
- A Survey of High-Velocity Molecular Gas in the Vicinity of Herbig-Haro Objects. I. *Suzan Edwards and Ronald L. Snell.* **270**, 605, 84-F8 (1983)
- Detection of Radio Emission from the Becklin-Neugebauer Object. *J. M. Moran, G. Garay, M. J. Reid, R. Genzel, M. C. H. Wright, and R. L. Plambeck.* **271**, L31, 93-C3 (1983)
- Infrared Observations of R136, the Central Object of the 30



- Doradus Nebula. *Nino Panagia, Enrico G. Tanzi, and Massimo Tarenghi.* **272**, 123, 102-D4 (1983)
- Stellar Winds Driven by Multiline Scattering. *David B. Friend and John I. Castor.* **272**, 259, 103-G3 (1983)
- Late Stages of Stellar Evolution. II. Mass Loss and the Transition of Asymptotic Giant Branch Stars into Hot Remnants. *Detlef Schönberner.* **272**, 708, 109-E2 (1983)
- The Extreme LMC Supergiant HD 38489: An Optical and Ultraviolet Study. *Steven N. Shore and N. Sanduleak.* **273**, 177, 114-B8 (1983)
- Neutral Carbon in the Egg Nebula (AFGL 2688). *C. A. Beichman, Jocelyn Keene, T. G. Phillips, P. J. Huggins, H. A. Wootten, C. Masson, and M. A. Frerking.* **273**, 633, 120-D13 (1983)
- Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? *José M. Torrelles, Luis F. Rodríguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho.* **274**, 214, 126-B10 (1983)
- OH/IR Stars: Late Stages of Evolution of Intermediate-Mass Stars. *Teije de Jong.* **274**, 252, 125-E7 (1983)
- The Circumstellar Envelopes and Chromospheres of Cool Giants and Supergiants. *Wendy Hagen, Robert E. Stencel, and Dale F. Dickinson.* **274**, 286, 127-A1 (1983)
- Circumstellar Envelope Structure of Late-Type Stars. *P. F. Bowers, K. J. Johnston, and J. H. Spencer.* **274**, 733, 133-D4 (1983)
- First Detection of Winds in Red Giants by Microwave Continuum Techniques. *S. A. Drake and J. L. Linsky.* **274**, 177, 136-C3 (1983)
- Jets from Young Stars. *Reinhard Mundt and Josef W. Fried.* **274**, L83, 136-C8 (1983)
- Mass Loss from Evolved Stars. II. Radio Continuum Emission and Evolution to Planetary Nebulae. *D. N. Spergel, J. L. Giuliani, Jr., and G. R. Knapp.* **275**, 330, 140-E10 (1983)
- Mass Loss Rates and Anisotropies in the Outflows from Late-Type Stars. *M. Jura.* **275**, 683, 145-A8 (1983)
- Radio Emission from Antares and an Ionized Cavity in Its Wind. *R. M. Hjellming and R. T. Newell.* **275**, 704, 154-C1 (1983)
- Alfvén Waves in Stellar Winds. *Thomas E. Holzer, Tor Flå, and Egil Leer.* **275**, 808, 146-D3 (1983)
- Ultraviolet Spectroscopic Observations of Some Be Stars of Later Type and A-F Type Shell Stars. *Arne Slettebak and Kenneth G. Carpenter.* **53**, 869, 28-G1 (1983) (Abstr. in **274**, 923, 135-E4)
- Stars: Metallic-Line**
- Diffusion, Meridional Circulation, and Mass Loss in Fm-Am Stars. *Georges Michaud, David Tarasick, Yves Charland, and Claude Pelletier.* **269**, 239, 67-F14 (1983)
- Stars: Neutron**
- A One-Zone Model for Shell Flashes on Accreting Compact Stars. *Bohdan Paczyński.* **264**, 282, 4-A1 (1983)
- Discovery of 13.5 s X-Ray Pulsations from LMC X-4 and an Orbital Determination. *R. L. Kelley, J. G. Jernigan, A. Levine, L. D. Petro, and S. Rappaport.* **264**, 568, 8-D13 (1983)
- The Thermonuclear Model for X-Ray Transients: Erratum. *R. K. Wallace, S. E. Woosley, and Thomas A. Weaver.* **264**, 746, 10-D10 (1983) (Orig. paper in **258**, 696, 81-A1)
- The Eddington Limit and Supercritical Accretion. II. Time-dependent Calculations. *H. L. Burger and J. I. Katz.* **265**, 393, 16-D3 (1983)
- Masses, Radii, and Magnetic Fields of Pulsating X-Ray Sources: Is the "Standard" Model Self-consistent? *Ira Wasserman and Stuart L. Shapiro.* **265**, 1036, 24-B2 (1983)
- Amorphous Glassy Plasma in Dense Stellar Matter. *Setsuo Ichimaru, Hiroshi Iyetomi, Shinichi Mitake, and Naoki Itoh.* **265**, L83, 26-D11 (1983)
- Accretion onto Magnetized Neutron Stars: X-Ray Pulsars with Intermediate Rotation Rates. *David J. Burnard, Susan M. Lea, and Jonathan Arons.* **266**, 175, 28-G10 (1983)
- Radio Pulsar Disk Electrodynamics. *F. Curtis Michel.* **266**, 188, 29-A9 (1983)
- Pair Creation above Pulsar Polar Caps: Geometrical Structure and Energetics of Slot Gaps. *Jonathan Arons.* **266**, 215, 29-C8 (1983)
- On Axisymmetric Perturbations of Some Rotating Stars. *William A. Hiscock.* **266**, 248, 29-E13 (1983)
- A Two-Component X-Ray Spectrum from SMC X-1. *F. E. Marshall, N. E. White, and R. H. Becker.* **266**, 814, 37-C4 (1983)
- Accreting X-Ray Pulsar Atmospheres Heated by Coulomb Deceleration of Protons. *P. Mészáros, A. K. Harding, J. G. Kirk, and D. J. Galloway.* **266**, L33, 32-C3 (1983)
- Models of X-Ray Bursters with Radius Expansion. *Bohdan Paczyński.* **267**, 315, 43-C11 (1983)
- The Effect of Sudden Mass Loss and a Random Kick Velocity Produced in a Supernova Explosion on the Dynamics of a Binary Star of Arbitrary Orbital Eccentricity. Applications to X-Ray Binaries and to the Binary Pulsars. *J. G. Hills.* **267**, 322, 43-D4 (1983)
- Equilibrium Composition and Neutrino Emissivity of Interacting Quark Matter in Neutron Stars. *Robert C. Duncan, Stuart L. Shapiro, and Ira Wasserman.* **267**, 358, 43-F12 (1983)
- The Central X-Ray Source in RCW 103: Evidence for Blackbody Emission. *J. R. Tuohy, G. P. Garmire, R. N. Manchester, and M. A. Dopita.* **268**, 778, 61-E14 (1983)
- Nonradial g-Mode Oscillations of Warm Neutron Stars. *P. N. McDermott, H. M. Van Horn, and J. F. Scholl.* **268**, 837, 62-C5 (1983)
- On the Evolutionary Status of Bright, Low-Mass X-Ray Sources. *R. F. Webbink, S. Rappaport, and G. J. Savonije.* **270**, 678, 85-E1 (1983)
- The Evolution of a Stripped Giant-Neutron Star Binary. *Ronald E. Taam.* **270**, 694, 85-F4 (1983)
- X-Rays from Radio Pulsars: The Detection of PSR 1055-52. *Andrew F. Cheng and David J. Helfand.* **271**, 271, 91-A4 (1983)
- Pulselike Character of Blackbody Radiation from Neutron Stars. *George Greenstein and Gregory J. Hartke.* **271**, 283, 91-B2 (1983)
- Structure of Neutron Star Envelopes. *E. H. Gudmundsson, C. J. Pethick, and R. I. Epstein.* **272**, 286, 104-B2 (1983)
- Implications of the Millisecond Pulsar for Neutron Star Models. *Stuart L. Shapiro, Saul A. Teukolsky, and Ira Wasserman.* **272**, 702, 109-D10 (1983)
- An Identification for "Geminga" (2CG 195+04) 1E 0630+178: A Unique Object in the Error Box of the High-Energy Gamma-Ray Source. *G. F. Bignami, P. A. Caraveo, and R. C. Lamb.* **272**, L9, 105-D13 (1983)
- Electrical and Thermal Conductivities of Dense Matter in the Liquid Metal Phase. I. High-Temperature Results. *Naoki Itoh, Shinichi Mitake, Hiroshi Iyetomi, and Setsuo Ichimaru.* **273**, 774, 122-A10 (1983)
- Observations of a Hard X-Ray Component in the Spectrum of Nova Ophiuchi. *C. K. Wilson and R. E. Rothschild.* **274**, 717, 133-C2 (1983)
- Hot Spots on Neutron Stars: The Near-Field Gravitational Lens. *K. R. Pechenick, C. Fiacco, and J. M. Cohen.* **274**, 846, 134-E8 (1983)
- Neutrino-Pair Bremsstrahlung in Dense Stars. I. Liquid Metal Case. *Naoki Itoh and Yasuharu Kohyama.* **275**, 858, 147-A1 (1983)
- Equilibrium Configurations of Neutron Stars and the Parametrized Post-Newtonian Metric Theories of Gravitation. *Ignazio Ciufolini and Remo Ruffini.* **275**, 867, 147-A10 (1983)
- The Quadrupole Oscillations of Neutron Stars. *Lee Lindblom and Steven L. Detweiler.* **53**, 73, 17-F7 (1983) (Abstr. in **271**,

**Stars: Neutron-Continued**

891, 99-B13)

The Radial Oscillations of Neutron Stars. *Edward N. Glass and Lee Lindblom*. **53**, 93, 17-G13 (1983) (Abstr. in **271**, 892, 99-B14)

**Stars: Novae**

WY Sagittae (Nova 1783): Spectroscopic Confirmation of Weaver's Candidate and Discovery of Deep Eclipses. *Michael M. Shara and Anthony F. J. Moffat*. **264**, 560, 8-D5 (1983)

Periodic Variability of the X-Ray Nova A0620-00 in Quiescence. *J. E. McClintock, L. D. Petro, R. A. Remillard, and G. R. Ricker*. **266**, L27, 32-B12 (1983)

CNO Abundances and the Strengths of Nova Outbursts and Hydrogen Flashes on Accreting White Dwarfs. *Jim MacDonald*. **267**, 732, 48-F14 (1983)

Nova Shells. *Judith G. Cohen and Ann J. Rosenthal*. **268**, 689, 60-F5 (1983)

Orbital Periods of Novae before Eruption. *Bradley E. Schaefer and Joseph Patterson*. **268**, 710, 61-A1 (1983)

H $\alpha$  Observations of Four Novae in M31. *Robin Ciardullo, Holland Ford, and George Jacoby*. **272**, 92, 102-A11 (1983)

On the Nature of Dwarf Novae. *J. Smak*. **272**, 234, 103-E6 (1983)

Cessation of the 63 Second Periodicity in the Light Curve of V533 Herculis. *E. L. Robinson and R. E. Nather*. **273**, 255, 115-A13 (1983)

The Outbursts of Symbiotic Novae. *Scott J. Kenyon and James W. Truran*. **273**, 280, 115-C10 (1983)

Mixing by Shear Instabilities in Differentially Rotating Inhomogeneous Stars with Application to Accreting White Dwarf Models for Novae. *Jim MacDonald*. **273**, 289, 115-D5 (1983)

On the Geometrical and Kinematic Structure of the Postnova Shell of HR Delphini. *Joseph Solf*. **273**, 647, 120-F1 (1983)

Observations of a Hard X-Ray Component in the Spectrum of Nova Ophiuchi. *C. K. Wilson and R. E. Rothschild*. **274**, 717, 133-C2 (1983)

Spectroscopy of Cataclysmic Variables. I. Observations. *Glen Williams*. **53**, 523, 24-A2 (1983) (Abstr. in **273**, 839, 122-F9)

**Stars: Of-Type**

Infrared Photometry and Mass Loss Rates for Of-Type Stars. *Paolo Persi, Marco Ferrari-Toniolo, and Gary L. Grasdale*. **269**, 625, 73-C5 (1983)

Observations of Of-Star Wind Variability. *C. A. Grady, T. P. Snow, Jr., and J. G. Timothy*. **271**, 691, 97-A13 (1983)

**Stars: Peculiar A**

Confirmation among Visual Multiples of an Increase of Ap Stars with Age. *Helmut A. Abt and Octavio Cardona*. **272**, 182, 103-A8 (1983)

Element Identifications in the Ultraviolet Spectrum of HD 101065. *G. Wegner, D. J. Cummins, P. B. Byrne, and D. J. Stickland*. **272**, 646, 108-G5 (1983)

The Resonance Lines of Aluminum in IUE Spectra of B-Type Chemically Peculiar Stars. *Kozo Sadakane, Masahide Takada, and Jun Jugaku*. **274**, 261, 126-F2 (1983)

Magnetic Overstability as an Excitation Mechanism of the Rapid Oscillations of Ap Stars. *Hiromoto Shibahashi*. **275**, L5, 141-F6 (1983)

The Magnetic Fields of the Helium-weak B Stars. *Ermanno F. Borra, J. D. Landstreet, and Ian Thompson*. **53**, 151, 18-D13 (1983) (Abstr. in **271**, 894, 99-C2)

**Stars: Population II**

Evolutionary Effects of Helium Diffusion in Population II Stars. *Guy S. Stringfellow, Peter Bodenheimer, Peter D. Noerdlinger, and Richard J. Arigo*. **264**, 228, 3-C14 (1983)

Spectroscopic Analysis of Dwarf and Subgiant Stars in 47 Tucanae. *R. A. Bell, James E. Hesser, and R. D. Cannon*. **269**, 580, 72-F13 (1983)

Nickel Overabundances in Extremely Metal-deficient Red Giants. *R. Earle Luck and Howard E. Bond*. **271**, L75, 100-C3 (1983)

**Stars: Pre-Main-Sequence**

The Near-Infrared Spectrum of the Herbig Ae-Be Stars. *D. Lorenzetti, P. Saraceno, and F. Strafella*. **264**, 554, 8-C13 (1983)

Water-Vapor Masers Located near Herbig-Haro Objects. *A. D. Haschick, J. M. Moran, L. F. Rodríguez, and P. T. P. Ho*. **265**, 281, 15-B13 (1983)

Identification of the Emission Features near 3.5 Microns in the Pre-Main-Sequence Star HD 97048. *F. Baas, L. J. Allamandola, T. R. Geballe, S. E. Persson, and J. H. Lacy*. **265**, 290, 15-C8 (1983)

The High-Velocity Molecular Flows near Young Stellar Objects. *John Bally and Charles J. Lada*. **265**, 824, 21-F10 (1983)

Interactions between Pre-Main-Sequence Objects and Molecular Clouds. I. Elias 1-12. *Russell M. Levreault*. **265**, 855, 22-B4 (1983)

Observations of H $_2$  Emission from Molecular Clouds and Herbig-Haro Objects. *Theodore Simon and R. R. Joyce*. **265**, 864, 22-B14 (1983)

The Exciting Stars of Herbig-Haro Objects. *Martin Cohen and Richard D. Schwartz*. **265**, 877, 22-C13 (1983)

$J = 2-1$  CO Observations of Molecular Clouds with High-Velocity Gas: Evidence for Clumpy Outflows. *Richard L. Plambeck, Ronald L. Snell, and Robert B. Loren*. **266**, 321, 30-D8 (1983)

Periodic Light Variations in Four Pre-Main-Sequence K Stars. *A. E. Rydgren and F. J. Vrba*. **267**, 191, 42-A8 (1983)

Spectral Energy Distributions of Young Stellar Objects. I. A Turbospheric Model for DR Tauri. *Roger K. Ulrich, Allen W. Shafter, George Hawkins, and Gillian Knapp*. **267**, 199, 42-B2 (1983)

High-Density Gas Associated with "Molecular Jets": NGC 1333 and NGC 2071. *P. R. Schwartz, John A. Waak, and Howard A. Smith*. **267**, L109, 51-C12 (1983)

Stellar Winds and Molecular Clouds: T Tauri Stars. *Nuria Calvet, Jorge Cantó, and L. F. Rodríguez*. **268**, 739, 61-C3 (1983)

The Environments of T Tauri Stars. *Roger A. Chevalier*. **268**, 753, 61-D3 (1983)

HH 1 and HH 2: The Results of an Eruptive Event in the Cohen-Schwartz Star? *Reinhard Mundt and Lee Hartmann*. **268**, 766, 61-E2 (1983)

Einstein Observations of the Rho Ophiuchi Dark Cloud: An X-Ray Christmas Tree. *Thierry Montmerle, Lydie Koch-Miramond, Edith Falgarone, and Jonathan E. Grindlay*. **269**, 182, 67-A11 (1983)

Observations of Suspected Low-Mass Post-T Tauri Stars and Their Evolutionary Status. *Reinhard Mundt, Frederick M. Walter, Eric D. Feigelson, Ulrich Finkenzeller, George H. Herbig, and Andrew P. Odell*. **269**, 229, 67-F3 (1983)

Infrared Observations of OB Star Formation in NGC 6334. *Paul M. Harvey and Ian Gatley*. **269**, 613, 73-B5 (1983)

The  $D^3-P$  Transition in Atomic Oxygen Induced by Collisions with Atomic Hydrogen. *S. R. Federman and E. J. Shipsey*. **269**, 791, 75-B4 (1983)

Magnetic Bubbles and High-Velocity Outflows in Molecular Clouds. *B. T. Draine*. **270**, 519, 82-G6 (1983)

A Survey of High-Velocity Molecular Gas in the Vicinity of Herbig-Haro Objects. I. *Suzan Edwards and Ronald L. Snell*. **270**, 605, 84-F8 (1983)

The Astrometric Position of T Tauri and the Nature of Its Companion. *Robert B. Hanson, B. F. Jones, and D. N. C. Lin*. **270**, L27, 81-B13 (1983)

Rotation among Orion Ic G Stars: Angular Momentum Loss Considerations in Pre-Main-Sequence Stars. *Myron A. Smith,*

- Jacques M. Beckers, and Samuel C. Barden. **271**, 237, 90-E11 (1983)
- Destruction of Ice Grains in T Tauri Stars. G. Strazzulla, V. Pirronello, and G. Foti. **271**, 255, 90-G1 (1983)
- Far-Infrared and Submillimeter Observations of Stellar Radiative and Wind Heating in S140 IRS. P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles. **271**, 625, 96-C13 (1983)
- Studies of Extremely Young Clusters. VII. Spectroscopic Observations of Faint Stars in the Orion Nebula. Merle F. Walker. **271**, 642, 96-E2 (1983)
- Optical Study of a Possible Bipolar Flow Associated with Herbig-Haro 12. Karen M. Strom, Stephen E. Strom, and John Stocke. **271**, L23, 93-B7 (1983)
- Herbig-Haro Objects in the Dust Globule ESO 210-6A. J. A. Graham and J. H. Elias. **272**, 615, 108-E2 (1983)
- The Unique Cometary Nebula Parsamian 13. Martin Cohen, D. K. Aitkin, P. F. Roche, and P. M. Williams. **273**, 624, 120-D2 (1983)
- Are Interstellar Toroids the Focusing Agent of the Bipolar Molecular Outflows? José M. Torrelles, Luis F. Rodríguez, Jorge Cantó, Patricia Carral, Jon Marcaide, James M. Moran, and Paul T. P. Ho. **274**, 214, 126-B10 (1983)
- Centrifugally Driven Winds from Contracting Molecular Disks. R. E. Pudritz and C. A. Norman. **274**, 677, 132-G4 (1983)
- The Birthline for Low-Mass Stars. Steven W. Stahler. **274**, 822, 134-C12 (1983)
- Far-Infrared Detection of Low-Luminosity Star Formation in the Bok Globule B335. Jocelyn Keene, J. A. Davidson, D. A. Harper, R. H. Hildebrand, D. T. Jaffe, R. F. Loewenstein, F. J. Low, and R. Pernic. **274**, L43, 129-D3 (1983)
- The Star-forming History of the Young Cluster NGC 2264. M. T. Adams, K. M. Strom, and S. E. Strom. **53**, 893, 29-A11 (1983) (Abstr. in **274**, 920, 135-E1)
- Stars: Proper-Motion**
- LHS 2924: A Uniquely Cool Low-Luminosity Star with a Peculiar Energy Distribution. Ronald G. Probst and James Liebert. **274**, 245, 126-D13 (1983)
- Luminosity and Motion of Large Proper Motion Stars. II. Stars with Annual Proper Motion Larger than 0.7 Arc Seconds. Olin J. Eggen. **51**, 183, 4-A2 (1983) (Abstr. in **264**, 747, 10-D11)
- Stars: Pulsation**
- Discovery of 13.5 s X-Ray Pulsations from LMC X-4 and an Orbital Determination. R. L. Kelley, J. G. Jernigan, A. Levine, L. D. Petro, and S. Rappaport. **264**, 568, 8-D13 (1983)
- Possible Mechanisms for the Hubble-Sandage (S Doradus) Variables. Richard Stothers and Chao-wen Chin. **264**, 583, 8-F2 (1983)
- The Rotational Spectrum of g-Modes in the Sun. Charles L. Wolff. **264**, 667, 9-E8 (1983)
- Precise Radial Velocities. II. A Possible Detection of Oscillations or Running Waves in Aldebaran and Arcturus. Myron A. Smith. **265**, 325, 15-F2 (1983)
- Pulsational Mode-Typing in Line Profile Variables. V. Multimodal and "Moving Shells" in  $\nu$  Eridani and Other  $\beta$  Cephei Stars. Myron A. Smith. **265**, 338, 15-G2 (1983)
- Time-resolved Ultraviolet and Optical Spectroscopy of the Pulsating X-Ray Source H2252-035. France A. Córdova, E. E. Fenimore, John Middleditch, and Keith O. Mason. **265**, 363, 16-B1 (1983)
- Testing Solar Models with Global Solar Oscillations in the 5-Minute Band. Roger K. Ulrich and Edward J. Rhodes, Jr. **265**, 551, 18-A10 (1983)
- Pulsation Properties of DA White Dwarfs: Radial Mode Instabilities. H. Saio, D. E. Winget, and E. L. Robinson. **265**, 982, 23-E2 (1983)
- The Structural Properties of Cepheid Velocity Curves. Norman R. Simon and Terry J. Teays. **265**, 996, 23-F2 (1983)
- Pulsation Mode Switching in HD 161796. J. D. Fernie. **265**, 999, 23-F5 (1983)
- Double-Mode RR Lyrae Variables in M15. Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy. **266**, 94, 28-A4 (1983)
- The Light and Velocity Curves of Classical Cepheids: Theory versus Observation. Norman R. Simon and Cecil G. Davis. **266**, 787, 37-A1 (1983)
- Nonradial g-Mode Oscillations of Warm Neutron Stars. P. N. McDermott, H. M. Van Horn, and J. F. Scholl. **268**, 837, 62-C5 (1983)
- The Discovery of Nonradial Instability Strips for Hot, Evolved Stars. Sumner G. Starrfield, Arthur N. Cox, Stephen W. Hodson, and W. D. Pesnell. **268**, L27, 57-C3 (1983)
- The Pulsation Properties of DB White Dwarfs: A Preliminary Analysis. D. E. Winget, H. M. Van Horn, M. Tassoul, C. J. Hansen, and G. Fontaine. **268**, L33, 57-C10 (1983)
- The Near-Infrared Cepheid Distance Scale. I. Preliminary Galactic Calibration. R. McGonegal, C. W. McAlary, R. A. McLaren, and B. F. Madore. **269**, 641, 73-D10 (1983)
- Theoretical Radial Pulsation Analyses of DA White Dwarfs. Sumner Starrfield, Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy. **269**, 645, 73-D14 (1983)
- The Light Curve of the ZZ Ceti Star G226-29. S. O. Kepler, E. L. Robinson, and R. E. Nather. **271**, 744, 97-E11 (1983)
- HYDRA: An Implicit Partial Differential Equation, Relaxation, Stability Analysis Package. R. F. Stellingwerf. **271**, 876, 99-A12 (1983)
- The Evolutionary State and Pulsation Characteristics of Red Variables in Globular Clusters. Jay A. Frogel. **272**, 167, 102-G6 (1983)
- Pulsational Constraints on the Mass and Luminosity of R Coronae Borealis Stars. Hideyuki Saio and J. Craig Wheeler. **272**, L25, 105-F3 (1983)
- Cessation of the 63 Second Periodicity in the Light Curve of V533 Herculis. E. L. Robinson and R. E. Nather. **273**, 255, 115-A13 (1983)
- Temperature-Grid Coordinates for Treating Pulsations in the Hydrogen Ionization Zone. Toshiaki Aikawa and Norman R. Simon. **273**, 346, 116-A11 (1983)
- OH/IR Masers. IV. Evolution, Pulsation, and Nature of the Sources. Terry J. Jones, A. R. Hyland, P. R. Wood, and Ian Gatley. **273**, 669, 121-A1 (1983)
- OH/IR Stars: Late Stages of Evolution of Intermediate-Mass Stars. Teije de Jong. **274**, 252, 125-E7 (1983)
- Period and Amplitude Variations of Polaris. A. Arellano Ferro. **274**, 755, 133-E12 (1983)
- Stellar Acoustics. I. Adiabatic Pulse Propagation and Modal Resonance in Polytropic Models of Bump Cepheids. Charles A. Whitney. **274**, 830, 134-D6 (1983)
- Tidal Gravitational Radiation from Homogeneous Stars. Clifford M. Will. **274**, 858, 134-F6 (1983)
- Optical Pulsations from HZ Herculis/Hercules X-1: The Self-consistent 35 Day Picture. John Middleditch. **275**, 278, 140-A14 (1983)
- Detection of High-Order Nonradial Oscillations on the Rapid Rotator Zeta Ophiuchi and Their Line with Be Type Outbursts. Steven S. Vogt and G. Donald Penrod. **275**, 661, 144-F14 (1983)
- Magnetic Overstability as an Excitation Mechanism of the Rapid Oscillations of Ap Stars. Hiromoto Shibahashi. **275**, L5, 141-F6 (1983)
- Carbon Star Formation and Neutron-rich Isotope Formation in Low-Mass Asymptotic Giant Branch Stars. Icko Iben, Jr. **275**, L65, 148-D5 (1983)
- Pulsations and Viscosity. J. P. Cox and B. L. Everson. **52**, 451, 16-D11 (1983) (Abstr. in **270**, 780, 86-E7)
- The Quadrupole Oscillations of Neutron Stars. Lee Lindblom

**Stars: Pulsation—Continued**

and Steven L. Detweiler. **53**, 73, 17-F7 (1983) (Abstr. in **271**, 891, 99-B13)

The Radial Oscillations of Neutron Stars. Edward N. Glass and Lee Lindblom. **53**, 93, 17-G13 (1983) (Abstr. in **271**, 892, 99-B14)

**Stars: Radio Radiation**

Radio Frequency Observations of Galactic X-Ray Sources. B. J. Geldzahler. **264**, L49, 11-B6 (1983)

Radio Pulsar Disk Electrodynamics. F. Curtis Michel. **266**, 188, 29-A9 (1983)

First Observations of Stellar Coronal Structure: The Coroneae of AR Lacertae. Frederick M. Walter, David M. Gibson, and Gibor S. Basri. **267**, 665, 48-A13 (1983)

High Spatial Resolution VLA Observations of the R Aquarii Jet. M. Kafatos, J. M. Hollis, and A. G. Michalitsianos. **267**, L103, 51-C7 (1983)

VLBI Observations of a Radio Flare of Circinus X-1. Robert A. Preston, David D. Morabito, Ann E. Wehrle, David L. Jauncey, Michael J. Batty, R. F. Haynes, Alan E. Wright, and George D. Nicolson. **268**, L23, 57-B13 (1983)

Gamma-Rays and the Production of Energetic Electrons in Enshrouding Material: A Model for the Quiescent Radio Emission from Cygnus X-3. W. Thomas Vestrand. **271**, 304, 91-C9 (1983)

Bright, Rapid, Highly Polarized Radio Spikes from the M Dwarf AD Leonis. Kenneth R. Lang, Jay Bookbinder, Leon Golub, and Michael M. Davis. **272**, L15, 105-E8 (1983)

The Discovery of a Hot Stellar Wind. Richard L. White and Robert H. Becker. **272**, L19, 105-E12 (1983)

Radio Emission from AM Herculis: The Quiescent Component and an Outburst. George A. Dulk, Timothy S. Bastien, and G. Chanmugam. **273**, 249, 115-A7 (1983)

Microwave Emission from the Coroneae of Late-Type Dwarf Stars. Jeffrey L. Linsky and Dale E. Gary. **274**, 776, 133-G5 (1983)

Synchronization of Magnetic Stars in Binary Systems. F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb. **274**, L71, 136-B12 (1983)

First Detection of Winds in Red Giants by Microwave Continuum Techniques. S. A. Drake and J. L. Linsky. **274**, L77, 136-C3 (1983)

Mass Loss from Evolved Stars. I. Radio Continuum Emission and Evolution to Planetary Nebulae. D. N. Spergel, J. L. Giuliani, Jr., and G. R. Knapp. **275**, 330, 140-E10 (1983)

Radio Emission from Antares and an Ionized Cavity in Its Wind. R. M. Hjellming and R. T. Newell. **275**, 704, 154-C1 (1983)

Limits to the Rate of Component Separation in Scorpius X-1. E. B. Fomalont, B. J. Geldzahler, R. M. Hjellming, and C. M. Wade. **275**, 802, 146-C11 (1983)

**Stars: Rotation**

Meridional Circulation of Rotating Stars. IV. The Approach to the Mean Steady State in Early-Type Stars. Jean-Louis Tassoul and Monique Tassoul. **264**, 298, 4-B3 (1983)

Protostellar Rotation: Turbulence and Heating of Molecular Clouds. José Franco. **264**, 508, 7-G6 (1983)

The Rotation of Horizontal-Branch Stars. I. Members of the Field. Ruth C. Peterson, Theodore D. Tarbell, and Bruce W. Carney. **265**, 972, 23-D6 (1983)

Accretion onto Magnetized Neutron Stars: X-Ray Pulsars with Intermediate Rotation Rates. David J. Burnard, Susan M. Lea, and Jonathan Arons. **266**, 175, 28-G10 (1983)

On Axisymmetric Perturbations of Some Rotating Stars. William A. Hiscock. **266**, 248, 29-E13 (1983)

Modeling of Steady, Rotational, Transonic Winds from Rotating Stars and Galaxies. D. A. Kopriva and J. R. Jokipii. **267**, 62, 40-F3 (1983)

Periodic Light Variations in Four Pre-Main-Sequence K Stars.

A. E. Rydgren and F. J. Vrba. **267**, 191, 42-A8 (1983)

Rapid Rotation and Stellar Activity in the Triple System HD 165590. Robert A. Stern and Andrew Skumanich. **267**, 232, 42-D8 (1983)

The Effect of Sudden Mass Loss and a Random Kick Velocity Produced in a Supernova Explosion on the Dynamics of a Binary Star of Arbitrary Orbital Eccentricity. Applications to X-Ray Binaries and to the Binary Pulsars. J. G. Hills. **267**, 322, 43-D4 (1983)

Meridional Circulation in Rotating Stars. V. Cooling White Dwarfs. Monique Tassoul and Jean-Louis Tassoul. **267**, 334, 43-E2 (1983)

Mass Loss from Rotating Magnetic Stars: Weber and Davis Re-visited. K. B. MacGregor and V. J. Pizzo. **267**, 340, 43-E8 (1983)

On the Stability of Rotating Stellar Models in General Relativity Theory. Lee Lindblom and William A. Hiscock. **267**, 384, 44-A10 (1983)

Necessary Conditions for the Stability of Rotating Newtonian Stellar Models. Lee Lindblom. **267**, 402, 44-B14 (1983)

Cosmic Turbulence and the Angular Momenta of Astronomical Systems: Erratum. Robert C. Fleck, Jr. **267**, 891, 50-D13 (1983) (Orig. paper in **261**, 631, 118-E11)

A Comment on "A Comparative Study of Rotational Properties of High-Velocity and Low-Velocity Early-Type Stars". Nolan R. Walborn. **267**, L59, 45-F4 (1983)

A Survey of Spectral Morphology and Rotational Velocities among the Helium-rich Stars. Nolan R. Walborn. **268**, 195, 54-B3 (1983)

Differential Rotation in F Stars: A Comparison between Theory and Observation. G. Belvedere and L. Paternò. **268**, 246, 54-E13 (1983)

An X-Ray Survey of Nine Algol Systems. N. E. White and F. E. Marshall. **268**, L117, 64-A9 (1983)

Diffusion, Meridional Circulation, and Mass Loss in Fm-Am Stars. Georges Michaud, David Tarasick, Yves Charland, and Claude Pelletier. **269**, 239, 67-F14 (1983)

Rotational Studies of Late-Type Stars. III. Rotation among BY Draconis Stars. Steven S. Vogt, David R. Soderblom, and G. Donald Penrod. **269**, 250, 67-G11 (1983)

A Two-dimensional Supernova Model with Rotation and Nuclear Burning. Peter Bodenheimer and S. E. Woosley. **269**, 281, 68-C3 (1983)

On the Large-Scale Dynamics of Rapidly Rotating Convection Zones. B. R. Durney. **269**, 671, 73-F14 (1983)

Stellar Images Derived from Rotation Broadening: AW Ursae Majoris. Lawrence Anderson, Darryl Stanford, and Douglas Leininger. **270**, 200, 79-B3 (1983)

Rotation among Orion Ic G Stars: Angular Momentum Loss Considerations in Pre-Main-Sequence Stars. Myron A. Smith, Jacques M. Beckers, and Samuel C. Barden. **271**, 237, 90-E11 (1983)

Meridional Circulation in Rotating Stars. VI. The Effects of Anisotropic Eddy Viscosity. Monique Tassoul and Jean-Louis Tassoul. **271**, 315, 91-D6 (1983)

Studies of Extremely Young Clusters. VII. Spectroscopic Observations of Faint Stars in the Orion Nebula. Merle F. Walker. **271**, 642, 96-E2 (1983)

The Light Curve of the ZZ Ceti Star G226-29. S. O. Kepler, E. L. Robinson, and R. E. Nather. **271**, 744, 97-E11 (1983)

X-Rays and Rotation among Post-T Tauri G Stars in Orion Ic. Myron A. Smith, Steven H. Pravdo, and William H.-M. Ku. **272**, 163, 102-G2 (1983)

HD 164615: A Probable Spotted Single F Type Star. Helmut A. Abt, Galen Bollinger, and Edward W. Burke, Jr. **272**, 196, 103-B10 (1983)

Mixing by Shear Instabilities in Differentially Rotating Inhomogeneous Stars with Application to Accreting White Dwarf Models for Novae. Jim MacDonald. **273**, 289, 115-



- D5 (1983)  
On the Corone of Rapidly Rotating Stars. IV. Coronal Activity in F Dwarfs and Implications for the Onset of the Dynamo. *F. M. Walter*. **274**, 794, 134-A12 (1983)
- Rapid Rotation among Pleiades K Dwarfs. *David R. Soderblom, Burton F. Jones, and Merle F. Walker*. **274**, L37, 129-C12 (1983)
- Synchronization of Magnetic Stars in Binary Systems. *F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb*. **274**, L71, 136-B12 (1983)
- Detection of High-Order Nonradial Oscillations on the Rapid Rotator Zeta Ophiuchi and Their Line with Be Type Outbursts. *Steven S. Vogt and G. Donald Penrod*. **275**, 661, 144-F14 (1983)
- The Rotation of Horizontal-Branch Stars. II. Members of the Globular Clusters M3, M5, and M13. *Ruth C. Peterson*. **275**, 737, 145-E6 (1983)
- Stellar Rotation in Lower Main-Sequence Stars Measured from Time Variations in H and K Emission-Line Fluxes. II. Detailed Analysis of the 1980 Observing Season Data. *Sallie L. Balunas, Arthur H. Vaughan, Lee Hartmann, Frans Middelkoop, Dimitri Mihalas, Robert W. Noyes, George W. Preston, James Frazer, and Howard Lanning*. **275**, 752, 145-F7 (1983)
- Rotational Studies of Late-Type Stars. II. Ages of Solar-Type Stars and the Rotational History of the Sun. *David R. Soderblom*. **53**, 1, 17-A3 (1983) (Abstr. in **271**, 889, 99-B11)
- Stars: RR Lyrae**  
Double-Mode RR Lyrae Variables in M15. *Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy*. **266**, 94, 28-A4 (1983)
- Metal Abundances of RR Lyrae Stars in Globular Clusters: Erratum. *Horace A. Smith and George J. Perkins*. **267**, 891, 50-D13 (1983) (Orig. paper in **261**, 576, 118-A8)
- Effects of Core Perturbations on the Structure of the Sun. *Allen V. Sweigart*. **273**, 795, 122-C4 (1983)
- A New Calibration of the Extragalactic Distance Scale Using Cepheids and RR Lyrae Stars. *Richard B. Stothers*. **274**, 20, 124-B11 (1983)
- AB Stars in the Southern Galactic Halo. II. Spectroscopy and Radial Velocities. *Jeffrey R. Pier*. **53**, 791, 27-E2 (1983) (Abstr. in **274**, 922, 135-E3)
- Stars: Spectral Classification**  
Studies of Luminous Stars in Nearby Galaxies. VIII. The Small Magellanic Cloud. *Roberta M. Humphreys*. **265**, 176, 14-A5 (1983)
- Metal-deficient O9-B0 Supergiants in the Small Magellanic Cloud. *Nolan R. Walborn*. **265**, 716, 20-E6 (1983)
- A Proposed New White Dwarf Spectral Classification System. *Edward M. Sion, Jesse L. Greenstein, John D. Landstreet, James Liebert, Harry L. Shipman, and Gary A. Wegner*. **269**, 253, 68-A1 (1983)
- Studies of Extremely Young Clusters. VII. Spectroscopic Observations of Faint Stars in the Orion Nebula. *Merle F. Walker*. **271**, 642, 96-E2 (1983)
- Confirmation among Visual Multiples of an Increase of Ap Stars with Age. *Helmut A. Abt and Octavio Cardona*. **272**, 182, 103-A8 (1983)
- Wolf-Rayet Stars in M33. *Philip Massey and Peter S. Conti*. **273**, 576, 119-G8 (1983)
- The Case Low-Dispersion Northern Sky Survey. I. *Peter Pesch and N. Sanduleak*. **51**, 171, 3-D1 (1983) (Abstr. in **263**, 1006, 142-F7)
- A Catalog of Spectral Classification and Photometry of Barium Stars. *P. K. Lü, D. W. Dawson, A. R. Uggren, and E. W. Weis*. **52**, 169, 11-E11 (1983) (Abstr. in **268**, 905, 63-A8)
- Stars: Spectrum Variables**  
Observational Studies of the Symbiotic Stars. II. Emission-Line Relative Intensity Variations in CI Cygni, BF Cygni, AX Persei, and V1016 Cygni. *Nancy A. Oliverson and Christopher M. Anderson*. **268**, 250, 54-F3 (1983)
- Stars: Stellar Dynamics**  
Numerical Simulations of the Decay of Satellite Galaxy Orbits. *D. N. C. Lin and Scott Tremaine*. **264**, 364, 6-C9 (1983)
- Preferred Orbit Planes in the Gravitational Field of a Tumbling Spheroidal Galaxy. *Richard H. Durisen, Joel E. Tohline, Joseph A. Burns, and Anthony R. Dobrovolskis*. **264**, 392, 6-E9 (1983)
- Feeding Quasars with Stellar Winds. *J. Michael Shull*. **264**, 446, 7-B11 (1983)
- Stability Limits for "Isothermal" Cores in Globular Cluster Models: Two-Component Systems. *J. Katz and L. G. Taff*. **264**, 476, 7-E2 (1983)
- The Long Term Evolution of Rotating Stellar Bars. *P. Carnevali*. **265**, 701, 20-D4 (1983)
- Normal Modes of Relaxation in Stellar Systems: Dynamical Friction and Thermalization. *David Layzer*. **266**, 831, 37-D8 (1983)
- Stellar Orbits in a Triaxial Galaxy. I. Orbits in the Plane of Rotation. *Tim de Zeeuw and David Merritt*. **267**, 571, 47-A13 (1983)
- Binary-Single Star Scattering. I. Numerical Experiments for Equal Masses. *Piet Hut and John N. Bahcall*. **268**, 319, 55-D6 (1983)
- Binary-Single Star Scattering. II. Analytic Approximations for High Velocity. *Piet Hut*. **268**, 342, 55-F1 (1983)
- On the Equilibrium Configurations of Prolate, Axisymmetric Stellar Systems. *Courtland L. Bohn*. **268**, 646, 60-C4 (1983)
- The Infall of a Star into a Massive Black Hole. *R. A. Nolthenius and J. I. Katz*. **269**, 297, 68-D5 (1983)
- Analysis of Box Orbits in a Triaxial Galaxy. *M. Vietri and M. Schwarzschild*. **269**, 487, 71-F13 (1983)
- A Modification of the Newtonian Dynamics as a Possible Alternative to the Hidden Mass Hypothesis. *M. Milgrom*. **270**, 365, 82-B5 (1983)
- A Modification of the Newtonian Dynamics: Implications for Galaxies. *M. Milgrom*. **270**, 371, 82-B11 (1983)
- A Modification of the Newtonian Dynamics: Implications for Galaxy Systems. *M. Milgrom*. **270**, 384, 82-C10 (1983)
- Numerical Experiments on the Clustering of Galaxies. *R. H. Miller*. **270**, 390, 82-D2 (1983)
- Core Collapse with Strong Encounters. *Jeremy Goodman*. **270**, 700, 85-F10 (1983)
- The Collapse and Violent Relaxation of N-Body Systems: Mass Segregation and the Secondary Maximum. *R. T. Fardouki, G. L. Hoffman, and E. E. Salpeter*. **271**, 11, 88-B2 (1983)
- On the Effects of Strong Encounters in Stellar Systems. I. A Basis for Treating Anisotropic Systems. *James R. Ipser and Roberto Semenzato*. **271**, 294, 91-B13 (1983)
- The Riemann Disks. I. Equilibrium and Secular Evolution. *Martin D. Weinberg and Scott Tremaine*. **271**, 586, 96-A1 (1983)
- The Ellipticities of Globular Clusters and the Second Parameter Problem. *John Norris*. **272**, 245, 103-F3 (1983)
- Binaries as a Heat Source in Stellar Dynamics: Release of Binding Energy. *Piet Hut*. **272**, L29, 105-F7 (1983)
- On the Oscillations and the Stability of Stellar Systems. *Peter O. Vandervoort*. **273**, 511, 119-B9 (1983)
- Velocity Dispersion of Planetary Nebulae in the Nuclear Bulge of M31. *David G. Lawrie*. **273**, 562, 119-F8 (1983)
- Simulations of Sinking Satellites. *Simon D. M. White*. **274**, 53, 124-E2 (1983)
- The Vertical Growth and Structure of Galactic Disks. *Jens Verner Villumsen*. **274**, 632, 132-C11 (1983)
- Kinematics and Ages of Mira Variables in the Greater Solar Neighborhood. *S. P. Wyatt and J. H. Cahn*. **275**, 225, 139-E2 (1983)

**Stars: Stellar Dynamics—Continued**

Bifurcations, Gaps, and Stochasticity in Barred Galaxies. *G. Contopoulos*. **275**, 511, 143-B3 (1983)

**Stars: Stellar Statistics**

The Supernova near the Nuclei of M31 and the Galaxy. *Sidney van den Bergh*. **265**, 719, 20-E9 (1983)

The Galactic Spheroid. *John N. Bahcall, Maarten Schmidt, and Raymond M. Soneira*. **265**, 730, 20-F6 (1983)

Stellar Contributions to the Hard X-Ray Galactic Ridge. *D. M. Worrall and F. E. Marshall*. **267**, 691, 48-C11 (1983)

The Galactic Gamma-Ray Source Population. *C. P. Godfrey*. **268**, 111, 53-B5 (1983)

Some Constraints on the Color-Magnitude Diagram of Giants in the Galactic Spheroid. *John N. Bahcall, Raymond M. Soneira, Donald C. Morton, and K. P. Tritton*. **272**, 627, 108-E14 (1983)

Self-regulated Star Formation in the Galaxy. *José Franco and Donald P. Cox*. **273**, 243, 115-A1 (1983)

An Infrared Search for Very Low Mass Stars: The Luminosity Function. *Ronald G. Probst*. **274**, 237, 126-D5 (1983)

OH/IR Stars: Late Stages of Evolution of Intermediate-Mass Stars. *Teije de Jong*. **274**, 252, 125-E7 (1983)

The Evolution of Massive Stars: The Numbers and Distribution of O Stars and Wolf-Rayet Stars. *Peter S. Conti, Catharine D. Garmany, C. de Loore, and D. Vanbeveren*. **274**, 302, 127-B3 (1983)

A Comparison of Theoretical to Observed Type I Supernova Rates. *Glenn E. Miller and Roger A. Chevalier*. **274**, 840, 134-E2 (1983)

Kinematics and Ages of Mira Variables in the Greater Solar Neighborhood. *S. P. Wyatt and J. H. Cahn*. **275**, 225, 139-E2 (1983)

Luminosity and Motion of Large Proper Motion Stars. II. Stars with Annual Proper Motion Larger than 0.7 Arc Seconds. *Olin J. Eggen*. **51**, 183, 4-A2 (1983) (Abstr. in **264**, 747, 10-D11)

The S201 Far-Ultraviolet Imaging Survey. I. Two Fields at High Galactic Latitude. *George R. Carruthers and Thornton Page*. **53**, 623, 25-C1 (1983) (Abstr. in **273**, 841, 122-F11)

**Stars: Subdwarfs**

Secondary Standard Stars for Absolute Spectrophotometry. *J. B. Oke and J. E. Gunn*. **266**, 713, 36-B4 (1983)

The Spectra of 12 New Subluminous O Stars. *J. S. Drilling*. **270**, L13, 81-A14 (1983)

Sharp Shortward-shifted Features in the Spectra of O Subdwarfs. *Frederick C. Bruhweiler and Charles A. Dean*. **274**, L87, 136-D6 (1983)

**Stars: Supergiants**

M Supergiants and the Distance to M101. *R. M. Humphreys and S. E. Strom*. **264**, 458, 7-C9 (1983)

Possible Mechanisms for the Hubble-Sandage (S Doradus) Variables. *Richard Stothers and Chao-wen Chin*. **264**, 583, 8-F2 (1983)

Studies of Luminous Stars in Nearby Galaxies. VIII. The Small Magellanic Cloud. *Roberta M. Humphreys*. **265**, 176, 14-A5 (1983)

Metal-deficient O9-B0 Supergiants in the Small Magellanic Cloud. *Nolan R. Walborn*. **265**, 716, 20-E6 (1983)

Pulsation Mode Switching in HD 161796. *J. D. Fernie*. **265**, 999, 23-F5 (1983)

Mass Loss in HR 1040 (A0 Ia): Analysis of Mg II  $\lambda$ 2802 and H $\alpha$ . *Paul B. Kunasz, Nancy D. Morrison, and B. Spessart*. **266**, 739, 36-D4 (1983)

Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. *Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers*. **268**, 205, 54-B14 (1983)

Possible Evidence for the Driving of the Winds of Hot Stars by Alfvén Waves. *Anne B. Underhill*. **268**, L127, 64-B1 (1983)

The Brightest Stars as Extragalactic Distance Indicators. *Roberta M. Humphreys*. **269**, 335, 70-A5 (1983)

High Angular Resolution Observations of Alpha Orionis with a Rotation Shearing Interferometer. *C. Roddier and F. Roddier*. **270**, L23, 81-B9 (1983)

X-Ray Spectra of Orion OB Supergiants. *Joseph P. Cassinelli and J. H. Swank*. **271**, 681, 97-A1 (1983)

Long-Period Variables in the Magellanic Clouds: Supergiants, AGB Stars, Supernova Precursors, Planetary Nebula Precursors, and Enrichment of the Interstellar Medium. *P. R. Wood, M. S. Bessell, and M. W. Fox*. **272**, 99, 102-B8 (1983)

A Comment on Red Supergiant Variables in the SMC. *Jay A. Frogel*. **272**, 116, 102-C11 (1983)

The Extreme LMC Supergiant HD 38489: An Optical and Ultraviolet Study. *Steven N. Shore and N. Sanduleak*. **273**, 177, 114-B8 (1983)

The Circumstellar Envelopes and Chromospheres of Cool Giants and Supergiants. *Wendy Hagen, Robert E. Stencel, and Dale F. Dickinson*. **274**, 286, 127-A1 (1983)

An Infrared Search for Luminous Stars in the Bar West Field of the Large Magellanic Cloud. *Jay A. Frogel and Harvey B. Richer*. **275**, 84, 138-A1 (1983)

New *UBVR* Photometry for 900 Supergiants. *J. D. Fernie*. **52**, 7, 9-A8 (1983) (Abstr. in **267**, 893, 50-E1)

Ultraviolet and Optical Studies of Binaries with Luminous Cool Primaries and Hot Companions. III. Reticon Radial Velocities. *Sidney B. Parsons*. **53**, 553, 24-E1 (1983) (Abstr. in **273**, 839, 122-F9)

**Stars: Supernovae**

Explosive Helium Burning in Supernovae: A Source of *r*-Process Elements. *J. J. Cowan, A. G. W. Cameron, and J. W. Truran*. **265**, 429, 16-F11 (1983)

The Supernova near the Nuclei of M31 and the Galaxy. *Sidney van den Bergh*. **265**, 719, 20-E9 (1983)

Self-similar Stellar Collapse. *Amos Yahil*. **265**, 1047, 24-B13 (1983)

The Nature of NML Cygnus. *M. Morris and M. Jura*. **267**, 179, 41-G9 (1983)

The Effect of Sudden Mass Loss and a Random Kick Velocity Produced in a Supernova Explosion on the Dynamics of a Binary Star of Arbitrary Orbital Eccentricity. Applications to X-Ray Binaries and to the Binary Pulsars. *J. G. Hills*. **267**, 322, 43-D4 (1983)

Radioactive Models of Type I Supernovae. *Stuart R. Schurmann*. **267**, 779, 49-C10 (1983)

A Variable Radio Source in the Clumpy Irregular Galaxy Markarian 297. *D. S. Heesch, J. Heidmann, and Q. F. Yin*. **267**, L73, 51-A7 (1983)

Extinct Radioactivities: A Three-Phase Mixing Model. *Donald D. Clayton*. **268**, 381, 56-A12 (1983)

Infrared Light Curves of Type I Supernovae. II. Late Stages. *J. H. Elias and Jay A. Frogel*. **268**, 718, 61-A9 (1983)

Ring Ejection in Type II Supernovae: 1E 0102.2-7219 in the Small Magellanic Cloud. *Ian R. Tuohy and Michael A. Dopita*. **268**, L11, 57-A11 (1983)

A Two-dimensional Supernova Model with Rotation and Nuclear Burning. *Peter Bodenheimer and S. E. Woosley*. **269**, 281, 68-C3 (1983)

The Type I Supernova 1981b in NGC 4536: The First 100 Days. *David Branch, C. H. Lacy, Marshall L. McCall, P. G. Sutherland, A. Uomoto, J. C. Wheeler, and B. J. Wills*. **270**, 123, 78-C9 (1983)

The Effect of Trapped Lepton Number and Entropy on the Outcome of Stellar Collapse. *Adam Burrows and James M. Lattimer*. **270**, 735, 86-B3 (1983)

Neutron Capture Rates in the *r*-Process: The Role of Direct Radiative Capture. *G. J. Mathews, A. Mengoni, F.-K. Thielemann, and William A. Fowler*. **270**, 740, 86-B8 (1983)

The Probable Association of SN 1957d in NGC 5236 (M83)

- with an Unresolved Radio Source. *Robert L. Pennington and Reginald J. Dufour*. **270**, L7, 81-A8 (1983)
- Long-Period Variables in the Magellanic Clouds: Supergiants, AGB Stars, Supernova Precursors, Planetary Nebula Precursors, and Enrichment of the Interstellar Medium. *P. R. Wood, M. S. Bessell, and M. W. Fox*. **272**, 99, 102-B8 (1983)
- The Evolution of the Infrared Emission from the Type II Supernova 1980k in NGC 6946: The Dust Formation Model. *E. Dwek, M. F. A'Hearn, E. E. Becklin, R. Hamilton Brown, R. W. Capps, H. L. Dinerstein, Ian Gatley, D. Morrison, C. M. Telesco, A. T. Tokunaga, M. W. Werner, and C. G. Wynn-Williams*. **274**, 168, 125-F6 (1983)
- A Comparison of Theoretical to Observed Type I Supernova Rates. *Glenn E. Miller and Roger A. Chevalier*. **274**, 840, 134-E2 (1983)
- Stars: U Geminorum**
- IUE Observations of E1405-451: A New AM Herculis Type Cataclysmic Variable. *J. A. Nousek and S. H. Pravdo*. **266**, L39, 32-C8 (1983)
- A Second Cataclysmic Variable in a Globular Cluster. *Bruce Margon and Ronald A. Downes*. **274**, L31, 129-C6 (1983)
- Stars: Variables**
- Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. *K. O. Mason, J. Middleditch, F. A. Cordova, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer*. **264**, 575, 8-E6 (1983)
- Possible Mechanisms for the Hubble-Sandage (S Doradus) Variables. *Richard Stothers and Chao-wen Chin*. **264**, 583, 8-F2 (1983)
- H2215-086: King of the DQ Herculis Stars. *Joseph Patterson and J. E. Steiner*. **264**, L61, 11-C2 (1983)
- Periodic Variability of the X-Ray Nova A0620-00 in Quiescence. *J. E. McClintock, L. D. Petro, R. A. Remillard, and G. R. Ricker*. **266**, L27, 32-B12 (1983)
- IUE Observations of E1405-451: A New AM Herculis Type Cataclysmic Variable. *J. A. Nousek and S. H. Pravdo*. **266**, L39, 32-C8 (1983)
- A Large-Amplitude Photometric Periodicity on a T Tauri Star. *Bradley E. Schaefer*. **266**, L45, 32-C13 (1983)
- Periodic Light Variations in Four Pre-Main-Sequence K Stars. *A. E. Rydgren and F. J. Vrba*. **267**, 191, 42-A8 (1983)
- The Discovery of Nonradial Instability Strips for Hot, Evolved Stars. *Sumner G. Starnfield, Arthur N. Cox, Stephen W. Hodson, and W. D. Pesnell*. **268**, L27, 57-C3 (1983)
- Spectroscopy of Variable Blue Stellar Objects. *Peter D. Usher, Archibald Warnock III, and Richard F. Green*. **269**, 73, 65-F12 (1983)
- Discovery of Eclipses in the X-Ray Source HD 155638. *Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry*. **270**, L79, 87-D8 (1983)
- The Precataclysmic Nucleus of Abell 41. *Albert D. Grauer and Howard E. Bond*. **271**, 259, 90-G5 (1983)
- The Evolutionary State and Pulsation Characteristics of Red Variables in Globular Clusters. *Jay A. Frogel*. **272**, 167, 102-G6 (1983)
- HD 164615: A Probable Spotted Single F Type Star. *Helmut A. Abt, Galen Bollinger, and Edward W. Burke, Jr.* **272**, 196, 103-B10 (1983)
- Stimulated Emission and the Flat Balmer Decrements of Cataclysmic Variable Stars. *Moshe Elitzur, G. J. Ferland, W. G. Mathews, and G. A. Shields*. **272**, L55, 111-B3 (1983)
- Rapid Rotation among Pleiades K Dwarfs. *David R. Soderblom, Burton F. Jones, and Merle F. Walker*. **274**, L37, 129-C12 (1983)
- SS 433: Improved Evidence for a Persistent 160 Day Photometric Period. *Gary D. Henson, James C. Kemp, Mark S. Barbour, Daniel J. Kraus, Elia M. Leibowitz, and Tsevi Mazeh*. **275**, 247, 139-F10 (1983)
- Observations of Active Chromosphere Stars. *Bernard W. Bopp, John L. Africano, R. E. Stencel, P. V. Noah, and A. Klimke*. **275**, 691, 145-B2 (1983)
- Magnetic Overstability as an Excitation Mechanism of the Rapid Oscillations of Ap Stars. *Hiromoto Shibahashi*. **275**, L5, 141-F6 (1983)
- Stars: Visual Multiples**
- Rapid Rotation and Stellar Activity in the Triple System HD 165590. *Robert A. Stern and Andrew Skumanich*. **267**, 232, 42-D8 (1983)
- Confirmation among Visual Multiples of an Increase of Ap Stars with Age. *Helmut A. Abt and Octavio Cardona*. **272**, 182, 103-A8 (1983)
- Radio Emission from Antares and an Ionized Cavity in Its Wind. *R. M. Hjellming and R. T. Newell*. **275**, 704, 154-C1 (1983)
- Micrometer Observations of Double Stars and New Pairs. XI. *W. D. Heintz*. **51**, 249, 5-A1 (1983) (Abstr. in **264**, 748, 10-D12)
- Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, Belva G. Campbell, and Francis C. Fekel*. **51**, 309, 6-F1 (1983) (Abstr. in **265**, 1135, 25-B11)
- Speckle Interferometric Measurements of Binary Stars. VIII. *Harold A. McAlister, Elaine M. Hendry, William I. Hartkopf, and Belva G. Campbell*. **53**, 241, 19-D4 (1983) (Orig. paper in **51**, 309, 6-F1)
- Stars: Weak-Line**
- The Rotation of Horizontal-Branch Stars. I. Members of the Field. *Ruth C. Peterson, Theodore D. Turbell, and Bruce W. Carney*. **265**, 972, 23-D6 (1983)
- Secondary Standard Stars for Absolute Spectrophotometry. *J. B. Oke and J. E. Gunn*. **266**, 713, 36-B4 (1983)
- The R- and s-Process Nuclei in the Early History of the Galaxy: HD 122563. *Christopher Sneden and M. Parthasarathy*. **267**, 757, 49-A11 (1983)
- Nickel Overabundances in Extremely Metal-deficient Red Giants. *R. Earle Luck and Howard E. Bond*. **271**, L75, 100-C3 (1983)
- Stars: White Dwarfs**
- Two Hot, Low-Field Magnetic DA White Dwarfs. *James Liebert, Gary D. Schmidt, Richard F. Green, H. S. Stockman, and John T. McGraw*. **264**, 262, 3-F7 (1983)
- A One-Zone Model for Shell Flashes on Accreting Compact Stars. *Bohdan Paczyński*. **264**, 282, 4-A1 (1983)
- On the Evolution of Those Nuclei of Planetary Nebulae That Experience a Final Helium Shell Flash. *Icko Iben, Jr., James B. Kaler, James W. Truran, and Alvio Renzini*. **264**, 605, 9-A1 (1983)
- Pulsation Properties of DA White Dwarfs: Radial Mode Instabilities. *H. Saio, D. E. Winget, and E. L. Robinson*. **265**, 982, 23-E2 (1983)
- The Hot DO White Dwarf HD 149499 B: Einstein Redshift of a DB Progenitor with Carbon Features. *Edward M. Sion and Edward F. Guinan*. **265**, L87, 26-E1 (1983)
- Iron and Magnesium in the White Dwarf GD 40: A Test of Diffusion Theory. *Harry L. Shipman and Jesse L. Greenstein*. **266**, 761, 36-E12 (1983)
- Meridional Circulation in Rotating Stars. V. Cooling White Dwarfs. *Monique Tassoul and Jean-Louis Tassoul*. **267**, 334, 43-E2 (1983)
- CNO Abundances and the Strengths of Nova Outbursts and Hydrogen Flashes on Accreting White Dwarfs. *Jim MacDonald*. **267**, 732, 48-F14 (1983)
- X-Ray Evidence for White Dwarf Binaries in Globular Clusters. *Paul Hertz and Jonathan E. Grindlay*. **267**, L83, 51-B2 (1983)
- Observations of Ultraviolet Carbon Lines in the Spectra of

**Stars: White Dwarfs—Continued**

- Three DC White Dwarfs. *G. Wegner*. **268**, 282, 55-A9 (1983)
- X-Ray Spectra and Light Curves of Accreting Magnetic Degenerate Dwarfs. *James N. Imamura and Richard H. Durisen*. **268**, 291, 55-B4 (1983)
- The Pulsation Properties of DB White Dwarfs: A Preliminary Analysis. *D. E. Winget, H. M. Van Horn, M. Tassoul, C. J. Hansen, and G. Fontaine*. **268**, L33, 57-C10 (1983)
- A Proposed New White Dwarf Spectral Classification System. *Edward M. Sion, Jesse L. Greenstein, John D. Landstreet, James Liebert, Harry L. Shipman, and Gary A. Wegner*. **269**, 253, 68-A1 (1983)
- The Peculiar Cool White Dwarf LHS 1126: A Different Interpretation. *James Liebert and Conrad C. Dahn*. **269**, 258, 68-A7 (1983)
- Theoretical Radial Pulsation Analyses of DA White Dwarfs. *Sumner Starrfield, Arthur N. Cox, Stephen W. Hodson, and Sean P. Clancy*. **269**, 645, 73-D14 (1983)
- Mass Loss, Levitation, Accretion, and the Sharp-Lined Features in Hot White Dwarfs. *Frederick C. Bruhweiler and Yoji Kondo*. **269**, 657, 73-E14 (1983)
- Absorption of Radiation Propagating Obliquely in a Magnetoplasma. *A. Khandker, R. F. O'Connell, and G. W. Ford*. **269**, 668, 73-F11 (1983)
- Do All Barium Stars Have a White Dwarf Companion? *James F. Dominy and David L. Lambert*. **270**, 180, 78-G11 (1983)
- On the Evolutionary Status of Bright, Low-Mass X-Ray Sources. *R. F. Webbink, S. Rappaport, and G. J. Savonije*. **270**, 678, 85-E1 (1983)
- Identification of CW 1103 + 254 as a New Magnetic Variable. *H. S. Stockman, C. B. Foltz, G. D. Schmidt, and S. Tapia*. **271**, 725, 97-D5 (1983)
- Magnetism in the AM Herculis Variable CW 1103 + 254. *Gary D. Schmidt, H. S. Stockman, and Steven A. Grandi*. **271**, 735, 97-E1 (1983)
- The Light Curve of the ZZ Ceti Star G226-29. *S. O. Kepler, E. L. Robinson, and R. E. Nather*. **271**, 744, 97-E11 (1983)
- G74-7: A True DA,F (DAZ) White Dwarf. *P. Lacombe, James Liebert, F. Wesemael, and G. Fontaine*. **272**, 660, 109-A8 (1983)
- Cessation of the 63 Second Periodicity in the Light Curve of V533 Herculis. *E. L. Robinson and R. E. Nather*. **273**, 255, 115-A13 (1983)
- The Outbursts of Symbiotic Novae. *Scott J. Kenyon and James W. Truran*. **273**, 280, 115-C10 (1983)
- Mixing by Shear Instabilities in Differentially Rotating Inhomogeneous Stars with Application to Accreting White Dwarf Models for Novae. *Jim MacDonald*. **273**, 289, 115-D5 (1983)
- Collapse and Explosion of White Dwarfs. I. Precollapse Evolution. *J. Isern, J. Labay, M. Hernanz, and R. Canal*. **273**, 320, 115-F8 (1983)
- Electrical and Thermal Conductivities of Dense Matter in the Liquid Metal Phase. I. High-Temperature Results. *Naoki Itoh, Shinichi Mitake, Hiroshi Iyetomi, and Setsuo Ichimaru*. **273**, 774, 122-A10 (1983)
- An Infrared Search for Very Low Mass Stars: The Luminosity Function. *Ronald G. Probst*. **274**, 237, 126-D5 (1983)
- Synchronization of Magnetic Stars in Binary Systems. *F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb*. **274**, L71, 136-B12 (1983)
- The Cool DC White Dwarf Stein 2051B. *Gary Wegner and F. H. Yackovich*. **275**, 240, 139-F3 (1983)
- Model Atmospheres of Red Degenerate Stars. *Stelios Karpandis*. **275**, 342, 140-F8 (1983)
- Neutrino-Pair Bremsstrahlung in Dense Stars. I. Liquid Metal Case. *Naoki Itoh and Yasuharu Kohyama*. **275**, 858, 147-A1 (1983)

White Dwarfs and the Interstellar Medium. *A. K. Dupree and J. C. Raymond*. **275**, L71, 148-D10 (1983)

An Infrared Search for Very Low Mass Stars: *JHK* Photometry and Results for Composite Systems. *Ronald G. Probst*. **53**, 335, 21-D2 (1983) (Abstr. in **272**, 785, 110-C10)

Predicted Infrared Brightness of Stars within 25 Parsecs of the Sun. *Hugh M. Johnson and Christine D. Wright*. **53**, 643, 25-D8 (1983) (Abstr. in **273**, 840, 122-F10)

**Stars: Winds**

Feeding Quasars with Stellar Winds. *J. Michael Shull*. **264**, 446, 7-B11 (1983)

Infrared Photometry of O Stars. *John I. Castor and Theodore Simon*. **265**, 304, 15-D9 (1983)

The High-Velocity Molecular Flows near Young Stellar Objects. *John Bally and Charles J. Lada*. **265**, 824, 21-F10 (1983)

An Alternative Model for the Atmospheres of Wolf-Rayet and O Stars. *Anne B. Underhill*. **265**, 933, 23-A9 (1983)

Jets from Pre-Main-Sequence Stars: AS 353A and Its Associated Herbig-Haro Objects. *Reinhard Mundt, John Stocke, and Hervey S. Stockman*. **265**, L71, 26-C13 (1983)

Closed and Open Magnetic Fields in Stellar Winds. *D. J. Mullan and R. S. Steinolfson*. **266**, 823, 37-C14 (1983)

Modeling of Steady, Rotational, Transonic Winds from Rotating Stars and Galaxies. *D. A. Kopriva and J. R. Jokipii*. **267**, 62, 40-F3 (1983)

High-Velocity Outflow Sources in Molecular Clouds: The Case for Low-Mass Stars. *S. Beckwith, A. Natta, and E. E. Salpeter*. **267**, 596, 47-C12 (1983)

Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. *Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers*. **268**, 205, 54-B14 (1983)

Infall and Outflow of  $S^{+3}$  Ions in 15 Monocerotis, Tau Canis Majoris, and Iota Orionis. *Donald C. Morton*. **268**, 217, 54-C12 (1983)

Angular Momentum Loss and the Evolution of Cataclysmic Binaries. *Ronald E. Taam*. **268**, 361, 55-G6 (1983)

Stellar Winds and Molecular Clouds: T Tauri Stars. *Nuria Calvet, Jorge Cantó, and L. F. Rodríguez*. **268**, 739, 61-C3 (1983)

The Environments of T Tauri Stars. *Roger A. Chevalier*. **268**, 753, 61-D3 (1983)

Possible Evidence for the Driving of the Winds of Hot Stars by Alfvén Waves. *Anne B. Underhill*. **268**, L127, 64-B1 (1983)

The X-Ray Absorption Spectrum of 4U 1700-37 and Its Implications for the Stellar Wind of the Companion HD 153919. *N. E. White, T. R. Kallman, and J. H. Swank*. **269**, 264, 68-A13 (1983)

Self-similar Solutions for the Interaction Regions of Colliding Winds. *Roger A. Chevalier and James N. Imamura*. **270**, 554, 84-B13 (1983)

A Survey of High-Velocity Molecular Gas in the Vicinity of Herbig-Haro Objects. I. *Suzan Edwards and Ronald L. Snell*. **270**, 605, 84-F8 (1983)

Infrared Spectra of WN Stars. I. HD 50896. *D. J. Hillier, T. J. Jones, and A. R. Hyland*. **271**, 221, 90-D9 (1983)

Far-Infrared and Submillimeter Observations of Stellar Radiative and Wind Heating in S140 IRS. *P. R. Schwartz, Harley A. Thronson, Jr., Charles J. Lada, Howard A. Smith, W. Glaccum, D. A. Harper, and S. H. Knowles*. **271**, 625, 96-C13 (1983)

X-Ray Spectra of Orion OB Supergiants. *Joseph P. Cassinelli and J. H. Swank*. **271**, 681, 97-A1 (1983)

Observations of Of-Star Wind Variability. *C. A. Grady, T. P. Snow, Jr., and J. G. Timothy*. **271**, 691, 97-A13 (1983)

Stationary Flows in the Circumstellar Envelopes of M Giants. *A. G. G. M. Tielens*. **271**, 702, 97-B10 (1983)



- Optical Study of a Possible Bipolar Flow Associated with Herbig-Haro 12. *Karen M. Strom, Stephen E. Strom, and John Stocke*. **271**, L23, 93-B7 (1983)
- Infrared Observations of R136, the Central Object of the 30 Doradus Nebula. *Nino Panagia, Enrico G. Tanzi, and Massimo Tareghi*. **272**, 123, 102-D4 (1983)
- Photoionization Models for the Winds from Cataclysmic Variables. *T. R. Kallman*. **272**, 238, 103-E10 (1983)
- Stellar Winds Driven by Multiline Scattering. *David B. Friend and John I. Castor*. **272**, 259, 103-G3 (1983)
- Herbig-Haro Objects in the Dust Globule ESO 210-6A. *J. A. Graham and J. H. Elias*. **272**, 615, 108-E2 (1983)
- The Discovery of a Hot Stellar Wind. *Richard L. White and Robert H. Becker*. **272**, L19, 105-E12 (1983)
- The Formation of Resonance Lines in Locally Nonmonotonic Winds. II. An Amplitude Diagnostic. *L. B. Lucy*. **274**, 372, 127-G3 (1983)
- Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold*. **274**, 801, 134-B5 (1983)
- First Detection of Winds in Red Giants by Microwave Continuum Techniques. *S. A. Drake and J. L. Linsky*. **274**, L77, 136-C3 (1983)
- Jets from Young Stars. *Reinhard Mundt and Josef W. Fried*. **274**, L83, 136-C8 (1983)
- The Circumstellar and Nebular Environment of the Becklin-Neugebauer Object:  $\lambda = 2-5$  Micron Spectroscopy. *N. Scofield, S. G. Kleinmann, D. N. B. Hall, and S. T. Ridgway*. **275**, 201, 139-C3 (1983)
- Radio Emission from Antares and an Ionized Cavity in Its Wind. *R. M. Hjellming and R. T. Newell*. **275**, 704, 154-C1 (1983)
- Alfvén Waves in Stellar Winds. *Thomas E. Holzer, Tor Flå, and Egil Lser*. **275**, 808, 146-D3 (1983)
- Stars: Wolf-Rayet**
- Wolf-Rayet Stars in the LMC: How Faint Are the Faintest? *Philip Massey and Peter S. Conti*. **264**, 126, 2-C8 (1983)
- An Alternative Model for the Atmospheres of Wolf-Rayet and O Stars. *Anne B. Underhill*. **265**, 933, 23-A9 (1983)
- Spectroscopic and Photometric Analysis of the WN7 Eclipsing Binary CQ Cephei. *Kam-Ching Leung, Anthony F. J. Moffat, and Wilhelm Seggewiss*. **265**, 961, 23-C9 (1983)
- The Angular Diameters, Effective Temperatures, Radii, and Luminosities of 10 Wolf-Rayet Stars. *Anne B. Underhill*. **266**, 718, 36-B10 (1983)
- The Spectra of Wolf-Rayet Stars. I. Optical Line Strengths and the Hydrogen-to-Helium Ratios in WN Type Stars. *Peter S. Conti, E. Myckky Leep, and Douglas N. Perry*. **268**, 228, 54-D9 (1983)
- Ring Nebulae Associated with Wolf-Rayet Stars in the Large Magellanic Cloud. III. Kinematics of DEM 39, 231, 240, and 315. *You-Hua Chu*. **269**, 202, 67-D1 (1983)
- A Spectroscopic Study of Four Late-Type Galactic WN Stars: The Question of Duplicity. *Robert Lamontagne, Anthony F. J. Moffat, and Wilhelm Seggewiss*. **269**, 596, 73-A1 (1983)
- Infrared Spectra of WN Stars. I. HD 50896. *D. J. Hillier, T. J. Jones, and A. R. Hyland*. **271**, 221, 90-D9 (1983)
- Wolf-Rayet Stars in the Local Group Galaxies M31 and NGC 6822. *Anthony F. J. Moffat and Michael M. Shara*. **273**, 544, 119-E3 (1983)
- Wolf-Rayet Stars in M33. *Philip Massey and Peter S. Conti*. **273**, 576, 119-G8 (1983)
- The Evolution of Massive Stars: The Numbers and Distribution of O Stars and Wolf-Rayet Stars. *Peter S. Conti, Catharine D. Garmany, C. de Loore, and D. Vanbeveren*. **274**, 302, 127-B3 (1983)
- IUE Observations of the Exciting Stars of Giant H II Regions in M33: Supermassive Stars? *Philip Massey and J. B. Hutchings*. **275**, 578, 143-G9 (1983)
- Galactic Ring Nebulae Associated with Wolf-Rayet Stars. VIII. Summary and Atlas. *You-Hua Chu, Richard R. Treffers, and Karen B. Kwitter*. **53**, 937, 29-F8 (1983) (Abstr. in **274**, 923, 135-E4)
- Sun: Abundances**
- The Isotopic Composition of Solar-Flare Noble Gases. *David C. Black*. **266**, 889, 38-A12 (1983)
- Temporal Variations of Nucleonic Abundances in Solar Flare Energetic Particle Events. I. Well-connected Events. *G. M. Mason, G. Gloeckler, and D. Hovestadt*. **267**, 844, 50-A8 (1983)
- Isotopic Anomalies among Solar Energetic Particles: Contribution of Preacceleration in Collapsing Magnetic Neutral Sheets. *D. J. Mullan*. **268**, 385, 56-B2 (1983)
- Selective Nonresonant Acceleration of  $^3\text{He}^{++}$  and Heavy Ions by  $\text{H}^+$  Cyclotron Waves. *H. Vavogliss and K. Papadopoulos*. **270**, L95, 87-F3 (1983)
- A Redetermination of the Solar Abundance of Molybdenum. *E. Biémont, N. Grevesse, P. Hamauford, R. M. Lowe, and W. Whaling*. **275**, 889, 147-C4 (1983)
- Sun: Activity**
- The Rotational Spectrum of g-Modes in the Sun. *Charles L. Wolff*. **264**, 667, 9-E8 (1983)
- Large-Scale Patterns Formed by Solar Active Regions during the Ascending Phase of Cycle 21. *V. Gaizauskas, K. L. Harvey, J. W. Harvey, and C. Zwaan*. **265**, 1056, 24-C8 (1983)
- The Association of Radio Noise Storm Enhancements with the Appearance of Additional Material in the Corona. *A. Kerdraon, M. Pick, G. Trotter, C. Sawyer, R. Illing, W. Wagner, and L. House*. **265**, L19, 18-F1 (1983)
- Millisecond Time Variations in Hard X-Ray Solar Flares. *Alan L. Kiplinger, B. R. Dennis, A. Gordon Emslie, K. J. Frost, and L. E. Orwig*. **265**, L99, 26-E11 (1983)
- A Thermal Model of Sunspot Influence on Solar Luminosity. *P. Foukal, L. A. Fowler, and M. Livshits*. **267**, 863, 50-B13 (1983)
- Interpretation of Solar Irradiance Variations Using Ground-based Observations. *David H. Bruning and Barry J. La Bonte*. **271**, 853, 98-F12 (1983)
- The Anomalous Helium Component in the Heliosphere: The 1965 versus the 1972-1977 Solar Minimum. *M. Garcia-Munoz, K. R. Pyle, and J. A. Simpson*. **274**, L93, 136-D11 (1983)
- Sunspot Areas and Solar Irradiance Variations during 1980. *Douglas V. Hoyt, John A. Eddy, and Hugh S. Hudson*. **275**, 878, 147-B7 (1983)
- A Quantitative Test of Solar Modulation Theory: The Proton, Helium, and Electron Spectra from 1965 through 1979. *P. Evenson, M. Garcia-Munoz, P. Meyer, K. R. Pyle, and J. A. Simpson*. **275**, L15, 141-F14 (1983)
- Dynamo Generation of Magnetic Fields in Three-Dimensional Space: Solar Cycle Main Flux Tube Formation and Reversals. *Hirokazu Yoshimura*. **52**, 363, 15-C13 (1983) (Abstr. in **270**, 778, 86-E5)
- Sun: Atmosphere**
- Invalidity of Local Thermodynamic Equilibrium for Electrons in the Solar Transition Region. I. Fokker-Planck Results. *Edward C. Shoub*. **266**, 339, 30-E12 (1983)
- Induced Mass and Wave Motions in the Lower Solar Atmosphere. I. Effects of Shear Motion of Flux Tubes. *S. T. Wu, Y. Q. Hu, Y. Nakagawa, and E. Tandberg-Hanssen*. **266**, 866, 37-G1 (1983)
- The Role of Spicules in Heating the Solar Atmosphere: Implications of EUV Observations. *George L. Withbroe*. **267**, 825, 49-F14 (1983)
- High Resolution Telescope and Spectrograph Observations of

**Sun: Atmosphere—Continued**

- Solar Fine Structure in the 1600 Å Region. *J. W. Cook, G. E. Brueckner, and J.-D. F. Bartoe.* **270**, L89, 87-E2 (1983)  
 Interpretation of Solar Irradiance Variations Using Ground-based Observations. *David H. Bruning and Barry J. La Bonte.* **271**, 853, 98-F12 (1983)

**Sun: Atmospheric Motions**

- Observations of Global-Scale Photospheric Fraunhofer Line Shifts. *J. R. Kuhn.* **264**, 689, 9-G2 (1983)  
 Testing Solar Models with Global Solar Oscillations in the 5-Minute Band. *Roger K. Ulrich and Edward J. Rhodes, Jr.* **265**, 551, 18-A10 (1983)  
 Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. *J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado.* **265**, 1066, 24-D5 (1983)  
 Induced Mass and Wave Motions in the Lower Solar Atmosphere. I. Effects of Shear Motion of Flux Tubes. *S. T. Wu, Y. Q. Hu, Y. Nakagawa, and E. Tandberg-Hanssen.* **266**, 866, 37-G1 (1983)  
 Preliminary Observations of Velocity Fields at the Solar Poles. *L. E. Cram, B. R. Durney, and D. B. Guenther.* **267**, 442, 44-E13 (1983)  
 Chromospheric Jets: Possible Extreme-Ultraviolet Observations of Spicules. *K. P. Dere, J.-D. F. Bartoe, and G. E. Brueckner.* **267**, L65, 45-F10 (1983)  
 Fluid Motions in the Solar Chromosphere-Corona Transition Region. III. Active Region Flows from Wide Slit Dopplergrams. *R. G. Athay, J. B. Gurman, and W. Henze.* **269**, 706, 74-B9 (1983)  
 Selective Nonresonant Acceleration of  $^3\text{He}^{++}$  and Heavy Ions by  $\text{H}^+$  Cyclotron Waves. *H. Varvoglis and K. Papadopoulos.* **270**, L95, 87-F3 (1983)  
 Interpretation of Solar Type III Radio Emission. *Mitsuhiko Nambu and P. K. Shukla.* **271**, L35, 93-C7 (1983)  
 On the Propagation of Acoustic Waves in a Radiating Fluid. *Dimitri Mihalas and Barbara Weibel Mihalas.* **273**, 355, 116-B6 (1983)  
 Fluid Motions in the Solar Chromosphere-Corona Transition Region. IV. Mass Motions over Sunspot Umbrae. *J. B. Gurman and R. G. Athay.* **273**, 374, 116-C11 (1983)  
 Flux Changes in Small Magnetic Regions. *P. R. Wilson and G. W. Simon.* **273**, 805, 122-C14 (1983)

**Sun: Chromosphere**

- Submillimeter Extensions of the Solar Limb Determined from Observations of the Total Eclipse of 1982 July 31. *C. Lindsey, E. E. Becklin, J. T. Jefferies, F. Q. Orrall, M. W. Werner, and Ian Gatley.* **264**, L25, 5-B9 (1983)  
 Flare Loop Radiative Hydrodynamics. I. Basic Methods. *A. N. McClymont and Richard C. Canfield.* **265**, 483, 17-C9 (1983)  
 Flare Loop Radiative Hydrodynamics. II. Thermal Stability of Empirical Models. *A. N. McClymont and Richard C. Canfield.* **265**, 497, 17-D9 (1983)  
 Flare Loop Radiative Hydrodynamics. III. Nonlocal Radiative Transfer Effects. *Richard C. Canfield, George H. Fisher, and A. N. McClymont.* **265**, 507, 17-E5 (1983)  
 Fluid Motions in the Solar Chromosphere-Corona Transition Region. I. Line Widths and Doppler Shifts for C IV. *R. G. Athay, J. B. Gurman, W. Henze, and R. A. Shine.* **265**, 519, 17-F3 (1983)  
 Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. *J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado.* **265**, 1066, 24-D5 (1983)  
 Invalidity of Local Thermodynamic Equilibrium for Electrons in the Solar Transition Region. I. Fokker-Planck Results. *Edward C. Shoub.* **266**, 339, 30-E12 (1983)  
 Formation of the Cl I Lines at 1351 Å in the Solar Chromo-

sphere. *R. A. Shine.* **266**, 882, 38-A5 (1983)

- Flare Loop Radiative Hydrodynamics. IV. Dynamic Evolution of Unstable Semiempirical Loop Models. *Chang-Hyuk An, Richard C. Canfield, George H. Fisher, and A. N. McClymont.* **267**, 421, 44-D5 (1983)  
 Chromospheric Jets: Possible Extreme-Ultraviolet Observations of Spicules. *K. P. Dere, J.-D. F. Bartoe, and G. E. Brueckner.* **267**, L65, 45-F10 (1983)  
 Fluid Motions in the Solar Chromosphere-Corona Transition Region. III. Active Region Flows from Wide Slit Dopplergrams. *R. G. Athay, J. B. Gurman, and W. Henze.* **269**, 706, 74-B9 (1983)  
 Some Spectral Plasma Diagnostics for Prominences and Structures in the Middle Chromosphere. *Donald A. Landman.* **269**, 728, 74-D11 (1983)  
 Solar Emission Lines near 12 Microns. *J. Brault and R. Noyes.* **269**, L61, 76-C5 (1983)  
 Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. *R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner.* **270**, 270, 79-G7 (1983)  
 High Resolution Telescope and Spectrograph Observations of Solar Fine Structure in the 1600 Å Region. *J. W. Cook, G. E. Brueckner, and J.-D. F. Bartoe.* **270**, L89, 87-E2 (1983)  
 High Spatial and Temporal Resolution Observations of the Solar Ca II H Line. *L. E. Cram and Luc Damé.* **272**, 355, 104-G7 (1983)  
 A Static Model of Chromospheric Heating in Solar Flares. *Paul J. Ricchiazzi and Richard C. Canfield.* **272**, 739, 109-G5 (1983)  
 Fluid Motions in the Solar Chromosphere-Corona Transition Region. IV. Mass Motions over Sunspot Umbrae. *J. B. Gurman and R. G. Athay.* **273**, 374, 116-C11 (1983)  
 High-Resolution Photography of the Solar Chromosphere. XVII. Geometry of Ha Flare Loops Observed on the Disk. *R. E. Loughhead, Jia-Long Wang, and G. Blows.* **274**, 883, 135-A9 (1983)  
 On the Unresolved Fine Structures of the Solar Atmosphere in the  $3 \times 10^4$ – $2 \times 10^5$  K Temperature Region. *U. Feldman.* **275**, 367, 141-A5 (1983)

**Sun: Corona**

- MHD Stability of Incompressible Coronal Loops with Radiative Energy Loss. *Chang-Hyuk An.* **264**, 302, 4-B7 (1983)  
 Diamagnetic Force on a Flux Tube. *Tyan Yeh.* **264**, 630, 9-B12 (1983)  
 Magnetic Neutral Sheets in Evolving Fields. II. Formation of the Solar Corona. *E. N. Parker.* **264**, 642, 9-C10 (1983)  
 The Propagation of Energetic Ions in Magnetic Loops and Gamma-Ray Emission from Solar Flares. *Ellen G. Zweibel and Deborah A. Haber.* **264**, 648, 9-D2 (1983)  
 Ejection of Magnetic Fields from the Sun: Acceleration of a Solar Wind Containing Diamagnetic Plasmoids. *G. W. Pneuman.* **265**, 468, 17-B8 (1983)  
 Flare Loop Radiative Hydrodynamics. I. Basic Methods. *A. N. McClymont and Richard C. Canfield.* **265**, 483, 17-C9 (1983)  
 Flare Loop Radiative Hydrodynamics. II. Thermal Stability of Empirical Models. *A. N. McClymont and Richard C. Canfield.* **265**, 497, 17-D9 (1983)  
 Fluid Motions in the Solar Chromosphere-Corona Transition Region. I. Line Widths and Doppler Shifts for C IV. *R. G. Athay, J. B. Gurman, W. Henze, and R. A. Shine.* **265**, 519, 17-F3 (1983)  
 6 Centimeter Observations of Solar Bursts with 0.1 s Time Constant and Arcsec Resolution. *Arie Kattenberg and Marc Allaart.* **265**, 535, 17-G8 (1983)  
 Numerical Simulations of Loops Heated to Solar Flare Temperatures. I. Gasdynamics. *Chung-Chieh Cheng, E. S. Oran, G. A. Doschek, J. P. Boris, and J. T. Mariska.* **265**, 1090,

24-F4 (1983)

The Association of Radio Noise Storm Enhancements with the Appearance of Additional Material in the Corona. A. Kerdran, M. Pick, G. Trotter, C. Sawyer, R. Illing, W. Wagner, and L. House. **265**, L19, 18-F1 (1983)

Collisional Damping of Surface Waves in the Solar Corona. Bruce E. Gordon and Joseph V. Hollweg. **266**, 373, 31-A5 (1983)

Outflow from the Sun's Polar Corona. F. Q. Orrall, G. J. Rottman, and J. A. Klimchuk. **266**, L65, 32-E3 (1983)

Dynamics and Spectroscopy of Asymmetrical Heated Coronal Loops. John T. Mariska and Jay P. Boris. **267**, 404, 44-C7 (1983)

Flare Loop Radiative Hydrodynamics. IV. Dynamic Evolution of Unstable Semiempirical Loop Models. Chang-Hyuk An, Richard C. Canfield, George H. Fisher, and A. N. McClymont. **267**, 421, 44-D5 (1983)

The Role of Spicules in Heating the Solar Atmosphere: Implications of EUV Observations. George L. Withbroe. **267**, 825, 49-F14 (1983)

Solar Type II Radio Emission and the Shock Drift Acceleration of Electrons. Gordon D. Holman and M. E. Pesses. **267**, 837, 50-A1 (1983)

A Coronal Transient Associated with a High-Speed Type II Burst. T. E. Gergely, M. R. Kundu, and E. Hildner. **268**, 403, 56-C6 (1983)

Turbulent Resistive Heating of Solar Coronal Arches. Gregory Benford. **269**, 690, 74-A5 (1983)

VLA Observations of a Solar Active Region and Coronal Loops. D. McDonnell and M. R. Kundu. **269**, 698, 74-A13 (1983)

Fluid Motions in the Solar Chromosphere-Corona Transition Region. III. Active Region Flows from Wide Slit Dopplergrams. R. G. Athay, J. B. Gurman, and W. Henze. **269**, 706, 74-B9 (1983)

Direct Evidence of Type III Electron Streams Propagating in Coronal Streamers. M. R. Kundu, T. E. Gergely, P. J. Turner, and R. A. Howard. **269**, L67, 76-C11 (1983)

Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner. **270**, 270, 79-G7 (1983)

The Effect of a Non-Maxwellian Electron Distribution on Oxygen and Iron Ionization Balances in the Solar Corona. S. P. Owocki and J. D. Scudder. **270**, 758, 86-C13 (1983)

Determination of the Solar Wind Angular Momentum Flux from the Helios Data—An Observational Test of the Weber and Davis Theory. V. Pizzo, R. Schwenn, E. Marsch, H. Rosenbauer, K.-H. Mühllhäuser, and F. M. Neubauer. **271**, 335, 91-E14 (1983)

Radio Blips and Hard X-Rays in Solar Flares. A. O. Benz, T. E. X. Bernold, and B. R. Dennis. **271**, 355, 91-G6 (1983)

Magnetohydrodynamic Stability of Line-tied Coronal Arcades. I. Force-free Magnetic Fields without Embedded Prominences. S. Migliuolo and P. J. Cargill. **271**, 820, 98-D7 (1983)

Observations of High-Energy Jets in the Corona above the Quiet Sun, the Heating of the Corona, and the Acceleration of the Solar Wind. G. E. Brueckner and J.-D. F. Bartoe. **272**, 329, 104-E5 (1983)

Associations between Coronal Mass Ejections and Soft X-Ray Events. N. R. Sheeley, Jr., R. A. Howard, M. J. Koomen, and D. J. Michels. **272**, 349, 104-G1 (1983)

A Dynamical Model of Coronal Loops. Satoshi Hinata. **272**, 715, 109-E9 (1983)

Fluid Motions in the Solar Chromosphere-Corona Transition Region. IV. Mass Motions over Sunspot Umbrae. J. B. Gurman and R. G. Athay. **273**, 374, 116-C11 (1983)

Lines of Fe XII Sensitive to Coronal Electron Density. U.

Feldman, Leonard Cohen, and G. A. Doschek. **273**, 822, 122-E4 (1983)

The Effect of a Coronal Shock Wave on the Solar Wind Ionization State. S. P. Owocki and A. J. Hundhausen. **274**, 414, 128-C3 (1983)

The Solar Wind Ionization State as a Coronal Temperature Diagnostic. S. P. Owocki, T. E. Holzer, and A. J. Hundhausen. **275**, 354, 140-G6 (1983)

On the Unresolved Fine Structures of the Solar Atmosphere in the  $3 \times 10^4$ – $2 \times 10^5$  K Temperature Region. U. Feldman. **275**, 367, 141-A5 (1983)

New Identifications of Allowed  $2p^3s(^1P_g \rightarrow ^3P_1)$  Transitions and Forbidden  $2p^3s(^1P_g \rightarrow ^3P_1)$  Coronal Lines in the Ne I Sequence. Sidney O. Kastner. **275**, 922, 147-E9 (1983)

#### Sun: Eclipses

Submillimeter Extensions of the Solar Limb Determined from Observations of the Total Eclipse of 1982 July 31. C. Lindsey, E. E. Becklin, J. T. Jefferies, F. Q. Orrall, M. W. Werner, and Ian Gatley. **264**, L25, 5-B9 (1983)

#### Sun: Faculae

Magnetohydrostatic Model of Solar Faculae. Vladimir A. Oshrovich, T. Flå, and G. A. Chapman. **268**, 412, 56-D3 (1983)

Interpretation of Solar Irradiance Variations Using Ground-based Observations. David H. Bruning and Barry J. La Bonte. **271**, 853, 98-F12 (1983)

#### Sun: Flares

The Propagation of Energetic Ions in Magnetic Loops and Gamma-Ray Emission from Solar Flares. Ellen G. Zweibel and Deborah A. Haber. **264**, 648, 9-D2 (1983)

Solar Proton Flares with Weak Impulsive Phases. E. W. Cliver, S. W. Kahler, and P. S. McIntosh. **264**, 699, 10-A2 (1983)

Flare Loop Radiative Hydrodynamics. I. Basic Methods. A. N. McClymont and Richard C. Canfield. **265**, 483, 17-C9 (1983)

Flare Loop Radiative Hydrodynamics. II. Thermal Stability of Empirical Models. A. N. McClymont and Richard C. Canfield. **265**, 497, 17-D9 (1983)

Flare Loop Radiative Hydrodynamics. III. Nonlocal Radiative Transfer Effects. Richard C. Canfield, George H. Fisher, and A. N. McClymont. **265**, 507, 17-E5 (1983)

Simultaneous Ultraviolet Line and Hard X-Ray Bursts in the Impulsive Phase of Solar Flares. B. E. Woodgate, R. A. Shine, A. I. Poland, and L. E. Orwig. **265**, 530, 17-G1 (1983)

6 Centimeter Observations of Solar Bursts with 0.1 s Time Constant and Arcsec Resolution. Arie Kattenberg and Marc Allaart. **265**, 535, 17-G8 (1983)

Multispacecraft Hard X-Ray Observations of Fine Time Structure in Two Solar Flares. K. Hurley, M. Niel, R. Talon, I. V. Estulin, and V. Ch. Dolidze. **265**, 1076, 24-E1 (1983)

Observations of H $\alpha$  and Microwave Brightening Caused by a Distant Solar Flare. M. R. Kundu, D. M. Rust, and M. Bobrowsky. **265**, 1084, 24-E9 (1983)

Numerical Simulations of Loops Heated to Solar Flare Temperatures. I. Gasdynamics. Chung-Chieh Cheng, E. S. Oran, G. A. Doschek, J. P. Boris, and J. T. Mariska. **265**, 1090, 24-F4 (1983)

Numerical Simulations of Loops Heated to Solar Flare Temperatures. II. X-Ray and UV Spectroscopy. G. A. Doschek, Chung-Chieh Cheng, E. S. Oran, J. P. Boris, and J. T. Mariska. **265**, 1103, 24-G3 (1983)

Inner-Shell Transitions in Fe XIX–XXII in the X-Ray Spectra of Solar Flares and Tokamaks. K. J. H. Phillips, J. R. Le-men, R. D. Cowan, G. A. Doschek, and J. W. Leibacher. **265**, 1120, 25-A10 (1983)

Millisecond Time Variations in Hard X-Ray Solar Flares. Alan L. Kiplinger, B. R. Dennis, A. Gordon Emslie, K. J. Frost, and L. E. Orwig. **265**, L99, 26-E11 (1983)

Selective Acceleration of <sup>3</sup>He in Solar Flare Particles by Radiation Pressure. S. Hayakawa. **266**, 370, 31-A2 (1983)

**Sun: Flares—Continued**

- The Heating of Postflare Loops. *P. J. Cargill and E. R. Priest.* **266**, 383, 31-B1 (1983)
- The Isotopic Composition of Solar-Flare Noble Gases. *David C. Black.* **266**, 889, 38-A12 (1983)
- Flare Loop Radiative Hydrodynamics. IV. Dynamic Evolution of Unstable Semiempirical Loop Models. *Chang-Hyuk An, Richard C. Canfield, George H. Fisher, and A. N. McClymont.* **267**, 421, 44-D5 (1983)
- First-Order Fermi Acceleration in Solar Flares as a Mechanism for the Second-Step Acceleration of Prompt Protons and Relativistic Electrons. *T. Bai, H. S. Hudson, R. M. Pelling, R. P. Lin, R. A. Schwartz, and T. T. von Rosenvinge.* **267**, 433, 44-E3 (1983)
- Temporal Variations of Nucleonic Abundances in Solar Flare Energetic Particle Events. I. Well-connected Events. *G. M. Mason, G. Gloeckler, and D. Hovestadt.* **267**, 844, 50-A8 (1983)
- Isotopic Anomalies among Solar Energetic Particles: Contribution of Preacceleration in Collapsing Magnetic Neutral Sheets. *D. J. Mullan.* **268**, 385, 56-B2 (1983)
- Energy Dynamics in Stressed Magnetic Fields: The Filamentation and Flare Instabilities. *G. Van Hoven, R. S. Steinolfson, and T. Tachi.* **268**, 860, 62-D14 (1983)
- Microwave and Hard X-Ray Imaging of a Solar Flare on 1980 November 5. *P. Hoyng, K. A. Marsh, H. Zirin, and B. R. Dennis.* **268**, 865, 62-E5 (1983)
- X-Ray Line Ratios from Helium-like Ions: Updated Theory and SMM Flare Observations. *C. J. Wolfson, J. G. Doyle, J. W. Leibacher, and K. J. H. Phillips.* **269**, 319, 68-F2 (1983)
- The Impulsive Phase of Solar Flares. II. Characteristics of the Hard X-Rays. *John Leach and Vahé Petrosian.* **269**, 715, 74-C12 (1983)
- Release of Solar Cosmic Rays from the Corona: Rayleigh-Taylor Instability and Reconnection. *D. J. Mullan.* **269**, 765, 74-G6 (1983)
- Evidence for Inhomogeneous Thermal Sources of Two Similar Solar Spike Events of 1978 May 5 and December 4. *H. J. Wiehl and U. Desai.* **270**, 256, 79-F7 (1983)
- Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the *Hinotori* Satellite. *T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto.* **270**, L83, 87-D11 (1983)
- Selective Nonresonant Acceleration of  $^3\text{He}^{++}$  and Heavy Ions by H<sup>+</sup> Cyclotron Waves. *H. Varvoglis and K. Papadopoulos.* **270**, L95, 87-F3 (1983)
- Radio Blips and Hard X-Rays in Solar Flares. *A. O. Benz, T. E. X. Bernold, and B. R. Dennis.* **271**, 355, 91-G6 (1983)
- Thick-Target Bremsstrahlung Interpretation of Short Time-Scale Solar Hard X-Ray Features. *A. Gordon Emslie.* **271**, 367, 92-A4 (1983)
- Acceleration and Confinement of Energetic Particles in the 1980 June 7 Solar Flare. *S. R. Kane, K. Kai, T. Kosugi, S. Enome, P. B. Landecker, and D. L. McKenzie.* **271**, 376, 92-A14 (1983)
- He D<sub>3</sub> as a Diagnostic for the Hard and Soft X-Rays from Solar Flares. *Uri Feldman, Margaret Liggett, and Harold Zirin.* **271**, 832, 98-E5 (1983)
- Interpretation of Solar Type III Radio Emission. *Mitsuhiko Nambu and P. K. Shukla.* **271**, L35, 93-C7 (1983)
- A Static Model of Chromospheric Heating in Solar Flares. *Paul J. Ricchiazzi and Richard C. Canfield.* **272**, 739, 109-G5 (1983)
- Gamma-Ray Observational Constraints on the Origin of the Optical Continuum Emission from the White-Light Flare of 1980 July 1. *J. M. Ryan, E. L. Chupp, D. J. Forrest, S. M. Matz, E. Rieger, C. Reppin, G. Kanbach, and G. H. Share.* **272**, L61, 111-B8 (1983)
- Recurrent Pulse Trains in the Solar Hard X-Ray Flare of 1980 June 7. *Alan L. Kiplinger, B. R. Dennis, K. J. Frost, and L. E. Orwig.* **273**, 783, 122-B6 (1983)
- Implications of High-Energy Neutron Observations from Solar Flares. *R. Ramaty, R. J. Murphy, B. Kozlovsky, and R. E. Lingenfelter.* **273**, L41, 117-D12 (1983)
- Electron Cyclotron Wave Acceleration Outside a Flaring Loop. *Phillip Sprangle and Loukas Vlahos.* **273**, L95, 123-D3 (1983)
- Protons from the Decay of Solar Flare Neutrons. *Paul Evenson, Peter Meyer, and K. Roger Pyle.* **274**, 875, 135-A1 (1983)
- High-Resolution Photography of the Solar Chromosphere. XVII. Geometry of H $\alpha$  Flare Loops Observed on the Disk. *R. E. Loughhead, Jia-Long Wang, and G. Blows.* **274**, 883, 135-A9 (1983)
- The 1981 July 26–27 Flares: Magnetic Developments Leading to and Following Flares. *Harold Zirin.* **274**, 900, 135-B13 (1983)
- Observed Time Delays between Solar H $\alpha$  Flares and Microwave Bursts as Evidence for Various Energy Transport Mechanisms. *N. Kämpfer and A. Magun.* **274**, 910, 135-D5 (1983)
- Stochastic Three-Wave Interaction in Flaring Solar Loops. *Loukas Vlahos, R. R. Sharma, and K. Papadopoulos.* **275**, 374, 141-A12 (1983)
- Microwave Signatures from a Reconnecting Plasma Pinch, with Application to Loop Flares. *Yung Mok.* **275**, 901, 147-D2 (1983)
- Sun: General**
- A Thermal Model of Sunspot Influence on Solar Luminosity. *P. Foukal, L. A. Fowler, and M. Livshits.* **267**, 863, 50-B13 (1983)
- Sunspot Areas and Solar Irradiance Variations during 1980. *Douglas V. Hoyt, John A. Eddy, and Hugh S. Hudson.* **275**, 878, 147-B7 (1983)
- Sun: Granulation**
- Observations of Global-Scale Photospheric Fraunhofer Line Shifts. *J. R. Kuhn.* **264**, 689, 9-G2 (1983)
- Preliminary Observations of Velocity Fields at the Solar Poles. *L. E. Cram, B. R. Durney, and D. B. Guenther.* **267**, 442, 44-E13 (1983)
- Sun: Interior**
- The Rotational Spectrum of g-Modes in the Sun. *Charles L. Wolff.* **264**, 667, 9-E8 (1983)
- Testing Solar Models with Global Solar Oscillations in the 5-Minute Band. *Roger K. Ulrich and Edward J. Rhodes, Jr.* **265**, 551, 18-A10 (1983)
- Doubly Diffusive Magnetic Buoyancy Instability in the Solar Interior. *J. H. M. M. Schmitt and R. Rosner.* **265**, 901, 22-F4 (1983)
- Multiscale Model Equations for Turbulent Convection and Convective Overshoot. *Philip S. Marcus, William H. Press, and Saul A. Teukolsky.* **267**, 795, 49-D12 (1983)
- The Rate of the  $^3\text{He}(p, e^+ \nu)^4\text{He}$  Reaction. *P. E. Tegnér and Chr. Bargholtz.* **272**, 311, 104-C13 (1983)
- Effects of Core Perturbations on the Structure of the Sun. *Allen V. Sweigart.* **273**, 795, 122-C4 (1983)
- Deceleration of Grand Unified Theory Monopoles in a Plasma. *Andrew J. S. Hamilton and Craig L. Sarazin.* **274**, 399, 128-B2 (1983)
- Sun: Magnetic Fields**
- Diamagnetic Force on a Flux Tube. *Tyan Yeh.* **264**, 630, 9-B12 (1983)
- The Fiber Fine Structure during Solar Type IV Radio Bursts: Observations and Theory of Radiation in Presence of Localized Whistler Turbulence. *Thomas E. X. Bernold and Rudolf A. Treumann.* **264**, 677, 9-F4 (1983)
- Large-Scale Patterns Formed by Solar Active Regions during the Ascending Phase of Cycle 21. *V. Gaizauskas, K. L. Harvey, J. W. Harvey, and C. Zwaan.* **265**, 1056, 24-C8 (1983)
- The Structure of Twisted Magnetic Flux Tubes. *P. K. Brown-*



- ing and E. R. Priest. **266**, 848, 37-E11 (1983)
- Fluid Motions in the Solar Chromosphere-Corona Transition Region. III. Active Region Flows from Wide Slit Dopplergrams. R. G. Athay, J. B. Gurman, and W. Henze. **269**, 706, 74-B9 (1983)
- Magnetic Rotation of the Solar Photosphere. Herschel B. Snodgrass. **270**, 288, 80-A12 (1983)
- Speckle Image Reconstruction of Solar Features. R. V. Stachnik, P. Nisenson, and R. W. Noyes. **271**, L37, 93-C9 (1983)
- Flux Changes in Small Magnetic Regions. P. R. Wilson and G. W. Simon. **273**, 805, 122-C14 (1983)
- High-Resolution Photography of the Solar Chromosphere. XVII. Geometry of H $\alpha$  Flare Loops Observed on the Disk. R. E. Loughhead, Jia-Long Wang, and G. Blows. **274**, 883, 135-A9 (1983)
- The 1981 July 26-27 Flares: Magnetic Developments Leading to and Following Flares. Harold Zirin. **274**, 900, 135-B13 (1983)
- Dynamo Generation of Magnetic Fields in Three-Dimensional Space: Solar Cycle Main Flux Tube Formation and Reversals. Hirokazu Yoshimura. **52**, 363, 15-C13 (1983) (Abstr. in **270**, 778, 86-E5)
- Dynamically Consistent Nonlinear Dynamos Driven by Convection in a Rotating Spherical Shell. II. Dynamos with Cycles and Strong Feedbacks. Peter A. Gilman. **53**, 243, 20-A2 (1983) (Abstr. in **272**, 784, 110-C9)
- Sun: Prominences**
- Structure and Spectrum of Quiescent Prominences. IV. The Ultraviolet Ionization Continua of Hydrogen and Helium. J. N. Heasley and R. W. Milkey. **268**, 398, 56-C1 (1983)
- Some Spectral Plasma Diagnostics for Prominences and Structures in the Middle Chromosphere. Donald A. Landman. **269**, 728, 74-D11 (1983)
- Physical Conditions in the Cool Parts of Prominences. Donald A. Landman. **270**, 265, 79-G2 (1983)
- A Self-similar Magnetohydrostatic Model of a Quiescent Prominence. Vladimir Osherovich. **271**, 847, 98-F6 (1983)
- High-Resolution Photography of the Solar Chromosphere. XVII. Geometry of H $\alpha$  Flare Loops Observed on the Disk. R. E. Loughhead, Jia-Long Wang, and G. Blows. **274**, 883, 135-A9 (1983)
- Sun: Radio Radiation**
- Interferometric Observations of Solar Limb Structure at 2.6 Millimeters. P. G. Wannier, G. J. Hurford, and G. A. Seielstad. **264**, 660, 9-D14 (1983)
- The Fiber Fine Structure during Solar Type IV Radio Bursts: Observations and Theory of Radiation in Presence of Localized Whistler Turbulence. Thomas E. X. Bernold and Rudolf A. Treumann. **264**, 677, 9-F4 (1983)
- 6 Centimeter Observations of Solar Bursts with 0.1 s Time Constant and Arcsec Resolution. Arie Kattenberg and Marc Allaart. **265**, 535, 17-G8 (1983)
- Observations of H $\alpha$  and Microwave Brightening Caused by a Distant Solar Flare. M. R. Kundu, D. M. Rust, and M. Bobrowsky. **265**, 1084, 24-E9 (1983)
- The Association of Radio Noise Storm Enhancements with the Appearance of Additional Material in the Corona. A. Kerdran, M. Pick, G. Trotter, C. Sawyer, R. Illing, W. Wagner, and L. House. **265**, L19, 18-F1 (1983)
- Very Large Array Observations of Solar Active Regions. III. Multiple Wavelength Observations. Kenneth R. Lang, Robert F. Willson, and Victor Gaizauskas. **267**, 455, 44-F12 (1983)
- Solar Type II Radio Emission and the Shock Drift Acceleration of Electrons. Gordon D. Holman and M. E. Pesses. **267**, 837, 50-A1 (1983)
- A Coronal Transient Associated with a High-Speed Type II Burst. T. E. Gergely, M. R. Kundu, and E. Hildner. **268**, 403, 56-C6 (1983)
- Microwave and Hard X-Ray Imaging of a Solar Flare on 1980 November 5. P. Hoyng, K. A. Marsh, H. Zirin, and B. R. Dennis. **268**, 865, 62-E5 (1983)
- VLA Observations of a Solar Active Region and Coronal Loops. D. McDonnell and M. R. Kundu. **269**, 698, 74-A13 (1983)
- Release of Solar Cosmic Rays from the Corona: Rayleigh-Taylor Instability and Reconnection. D. J. Mullan. **269**, 765, 74-G6 (1983)
- Direct Evidence of Type III Electron Streams Propagating in Coronal Streamers. M. R. Kundu, T. E. Gergely, P. J. Turner, and R. A. Howard. **269**, L67, 76-C11 (1983)
- Solar Radio Emission Very near the Plasma Frequency. Donat G. Wentzel. **270**, 250, 79-F1 (1983)
- Evidence for Inhomogeneous Thermal Sources of Two Similar Solar Spike Events of 1978 May 5 and December 4. H. J. Wiehl and U. Desai. **270**, 256, 79-F7 (1983)
- Radio Blips and Hard X-Rays in Solar Flares. A. O. Benz, T. E. X. Bernold, and B. R. Dennis. **271**, 355, 91-G6 (1983)
- Bright, Rapid, Highly Polarized Radio Spikes from the M Dwarf AD Leonis. Kenneth R. Lang, Jay Bookbinder, Leon Golub, and Michael M. Davis. **272**, L15, 105-E8 (1983)
- Electron Cyclotron Wave Acceleration Outside a Flaring Loop. Phillip Sprangle and Loukas Vlahos. **273**, L95, 123-D3 (1983)
- Observed Time Delays between Solar H $\alpha$  Flares and Microwave Bursts as Evidence for Various Energy Transport Mechanisms. N. Kämpfer and A. Magun. **274**, 910, 135-D5 (1983)
- Stochastic Three-Wave Interaction in Flaring Solar Loops. Loukas Vlahos, R. R. Sharma, and K. Papadopoulos. **275**, 374, 141-A12 (1983)
- Microwave Signatures from a Reconnecting Plasma Pinch, with Application to Loop Flares. Yung Mok. **275**, 901, 147-D2 (1983)
- Sun: Rotation**
- The Rotational Spectrum of g-Modes in the Sun. Charles L. Wolff. **264**, 667, 9-E8 (1983)
- Large-Scale Patterns Formed by Solar Active Regions during the Ascending Phase of Cycle 21. V. Gaizauskas, K. L. Harvey, J. W. Harvey, and C. Zwaan. **265**, 1056, 24-C8 (1983)
- Magnetic Rotation of the Solar Photosphere. Herschel B. Snodgrass. **270**, 288, 80-A12 (1983)
- Determination of the Solar Wind Angular Momentum Flux from the Helios Data—An Observational Test of the Weber and Davis Theory. V. Pizzo, R. Schwenn, E. Marsch, H. Rosenbauer, K.-H. Mählhäuser, and F. M. Neubauer. **271**, 335, 91-E14 (1983)
- Quadrupole Moment of the Sun and the Planetary Orbits. L. Campbell and J. W. Moffat. **275**, L77, 148-E1 (1983)
- Rotational Studies of Late-Type Stars. II. Ages of Solar-Type Stars and the Rotational History of the Sun. David R. Soderblom. **53**, 1, 17-A3 (1983) (Abstr. in **271**, 889, 99-B11)
- Dynamically Consistent Nonlinear Dynamos Driven by Convection in a Rotating Spherical Shell. II. Dynamos with Cycles and Strong Feedbacks. Peter A. Gilman. **53**, 243, 20-A2 (1983) (Abstr. in **272**, 784, 110-C9)
- Sun: Solar Wind**
- Ejection of Magnetic Fields from the Sun: Acceleration of a Solar Wind Containing Diamagnetic Plasmoids. G. W. Pneuman. **265**, 468, 17-B8 (1983)
- Effects of Drift on the Transport of Cosmic Rays. VI. A Three-dimensional Model including Diffusion. J. Kóta and J. R. Jokipii. **265**, 573, 18-C4 (1983)
- The Magnetosphere of Uranus: Plasma Sources, Convection, and Field Configuration. G.-H. Voigt, T. W. Hill, and A. J. Dessler. **266**, 390, 31-B8 (1983)
- Outflow from the Sun's Polar Corona. F. Q. Orrall, G. J. Rottman, and J. A. Klimchuk. **266**, L65, 32-E3 (1983)
- Dynamic Stabilization of Hydromagnetic Surface Waves: Applications to Cometary Plasma Tails. B. Buti. **268**, 420, 56-

**Sun: Solar Wind—Continued**

- D11 (1983)
- Charge Exchange in Solar Wind—Cometary Interactions. *T. I. Gombosi, M. Horanyi, K. Kecskemety, T. E. Cravens, and A. F. Nagy.* **268**, 889, 62-G1 (1983)
- On the Penetration of the Solar Wind into the Cometary Ionosphere. *A. I. Ershkovich and D. A. Mendis.* **269**, 743, 74-E12 (1983)
- Spectral Broadening of Planetary Radar Signals by the Solar Wind. *J. K. Harmon and W. A. Coles.* **270**, 748, 86-C3 (1983)
- Determination of the Solar Wind Angular Momentum Flux from the Helios Data—An Observational Test of the Weber and Davis Theory. *V. Pizzo, R. Schwenn, E. Marsch, H. Rosenbauer, K.-H. Mühllhäuser, and F. M. Neubauer.* **271**, 335, 91-E14 (1983)
- Momentum Flux Invariance in the Solar Wind. *D. J. Mullan.* **272**, 325, 104-D14 (1983)
- Observations of High-Energy Jets in the Corona above the Quiet Sun, the Heating of the Corona, and the Acceleration of the Solar Wind. *G. E. Brueckner and J.-D. F. Bartoe.* **272**, 329, 104-E5 (1983)
- The Effect of MHD Instabilities on the Flaring of Cometary Plasma Tails. *Malcolm B. Niedner, Jr., Alexander I. Ershkovich, and John C. Brandt.* **272**, 362, 105-A3 (1983)
- Theoretical Non-Maxwellian Particle Velocity Distribution Functions for Spherically Symmetric Solar Wind-like Plasma Systems and Consequences. *Sami Cuperman, Itzhak Weiss, and Murray Dryer.* **273**, 363, 116-B14 (1983)
- The Effect of a Coronal Shock Wave on the Solar Wind Ionization State. *S. P. Owocki and A. J. Hundhausen.* **274**, 414, 128-C3 (1983)
- Charge Exchange in Solar Wind—Cometary Interactions: Erratum. *T. I. Gombosi, M. Horanyi, K. Kecskemety, T. E. Cravens, and A. F. Nagy.* **274**, 919, 135-D14 (1983) (Orig. paper in **268**, 889, 63-A1)
- The Anomalous Helium Component in the Heliosphere: The 1965 versus the 1972–1977 Solar Minimum. *M. Garcia-Munoz, K. R. Pyle, and J. A. Simpson.* **274**, L93, 136-D11 (1983)
- The Solar Wind Ionization State as a Coronal Temperature Diagnostic. *S. P. Owocki, T. E. Holzer, and A. J. Hundhausen.* **275**, 354, 140-G6 (1983)
- A Quantitative Test of Solar Modulation Theory: The Proton, Helium, and Electron Spectra from 1965 through 1979. *P. Evenson, M. Garcia-Munoz, P. Meyer, K. R. Pyle, and J. A. Simpson.* **275**, L15, 141-F14 (1983)
- Sun: Spectra**
- Fluid Motions in the Solar Chromosphere-Corona Transition Region. I. Line Widths and Doppler Shifts for C IV. *R. G. Athay, J. B. Gurman, W. Henze, and R. A. Shine.* **265**, 519, 17-F3 (1983)
- Formation of the C I Lines at 1351 Å in the Solar Chromosphere. *R. A. Shine.* **266**, 882, 38-A5 (1983)
- The Role of Spicules in Heating the Solar Atmosphere: Implications of EUV Observations. *George L. Withbroe.* **267**, 825, 49-F14 (1983)
- Structure and Spectrum of Quiescent Prominences. IV. The Ultraviolet Ionization Continua of Hydrogen and Helium. *J. N. Heasley and R. W. Milkey.* **268**, 398, 56-C1 (1983)
- Diode Laser Heterodyne Observations of Silicon Monoxide in Sunspots: A Test of Three Sunspot Models. *D. A. Glenar, D. Deming, D. E. Jennings, T. Kostiuik, and M. J. Mumma.* **269**, 309, 68-E4 (1983)
- Some Spectral Plasma Diagnostics for Prominences and Structures in the Middle Chromosphere. *Donald A. Landman.* **269**, 728, 74-D11 (1983)
- Solar Emission Lines near 12 Microns. *J. Brault and R. Noyes.* **269**, L61, 76-C5 (1983)
- Physical Conditions in the Cool Parts of Prominences. *Donald A. Landman.* **270**, 265, 79-G2 (1983)
- High Spatial and Temporal Resolution Observations of the Solar Ca II H Line. *L. E. Cram and Luc Damé.* **272**, 355, 104-G7 (1983)
- H I Lyman-Alpha in the Sun: The Effects of Partial Redistribution in the Line Wings. *D. Roussel-Dupré.* **272**, 723, 109-F3 (1983)
- Lines of Fe XII Sensitive to Coronal Electron Density. *U. Feldman, Leonard Cohen, and G. A. Doschek.* **273**, 822, 122-E4 (1983)
- Si III Line Ratios in the Sun. *P. L. Dufton, A. Hibbert, A. E. Kingston, and G. A. Doschek.* **274**, 420, 128-C9 (1983)
- A Redetermination of the Solar Abundance of Molybdenum. *E. Biémont, N. Grevesse, P. Hannaford, R. M. Lowe, and W. Whaling.* **275**, 889, 147-C4 (1983)
- Skylab Observations of the Solar C I Multiplets at  $\lambda 1560$  and  $\lambda 1657$ . *D. Roussel-Dupré.* **275**, 892, 147-C7 (1983)
- New Identifications of Allowed  $2p^3\text{3l} \rightarrow 2p^3\text{3l}'$  Transitions and Forbidden  $2p^3\text{3s}(^3P_0 \rightarrow ^3P_1)$  Coronal Lines in the Ne I Sequence. *Sidney O. Kastner.* **275**, 922, 147-E9 (1983)
- Identification of the Solar Emission Lines near 12 Microns. *E. S. Chang and R. W. Noyes.* **275**, L11, 141-F11 (1983)
- The Solar O III Spectrum. II. Longer Wavelengths, Line Widths, and the He II Lyman  $\alpha$  Radiation Field. *S. O. Kastner, W. E. Behring, and A. K. Bhatia.* **53**, 129, 18-C6 (1983) (Abstr. in **271**, 892, 99-B14)
- Sun: Spectroheliogram**
- High Resolution Telescope and Spectrograph Observations of Solar Fine Structure in the 1600 Å Region. *J. W. Cook, G. E. Brueckner, and J.-D. F. Bartoe.* **270**, L89, 87-E2 (1983)
- Sun: Sunspots**
- Large-Scale Patterns Formed by Solar Active Regions during the Ascending Phase of Cycle 21. *V. Gaizauskas, K. L. Harvey, J. W. Harvey, and C. Zwaan.* **265**, 1056, 24-C8 (1983)
- The Broad-Band Circular Polarization of Sunspots, 0.37–4.5 Microns. *James C. Kemp and Gary D. Henson.* **266**, L69, 32-E7 (1983)
- A Thermal Model of Sunspot Influence on Solar Luminosity. *P. Foukal, L. A. Fowler, and M. Livshits.* **267**, 863, 50-B13 (1983)
- Diode Laser Heterodyne Observations of Silicon Monoxide in Sunspots: A Test of Three Sunspot Models. *D. A. Glenar, D. Deming, D. E. Jennings, T. Kostiuik, and M. J. Mumma.* **269**, 309, 68-E4 (1983)
- Interpretation of Solar Irradiance Variations Using Ground-based Observations. *David H. Bruning and Barry J. La Bonte.* **271**, 853, 98-F12 (1983)
- Speckle Image Reconstruction of Solar Features. *R. V. Stachnik, P. Nisenson, and R. W. Noyes.* **271**, L37, 93-C9 (1983)
- Fluid Motions in the Solar Chromosphere-Corona Transition Region. IV. Mass Motions over Sunspot Umbrae. *J. B. Gurman and R. G. Athay.* **273**, 374, 116-C11 (1983)
- The 1981 July 26–27 Flares: Magnetic Developments Leading to and Following Flares. *Harold Zirin.* **274**, 900, 135-B13 (1983)
- Sunspot Areas and Solar Irradiance Variations during 1980. *Douglas V. Hoyt, John A. Eddy, and Hugh S. Hudson.* **275**, 878, 147-B7 (1983)
- Sun: X-Rays**
- Multispacecraft Hard X-Ray Observations of Fine Time Structure in Two Solar Flares. *K. Hurley, M. Niel, R. Talon, I. V. Estulin, and V. Ch. Dolidze.* **265**, 1076, 24-E1 (1983)
- Numerical Simulations of Loops Heated to Solar Flare Temperatures. II. X-Ray and UV Spectroscopy. *G. A. Doschek, Chung-Chieh Cheng, E. S. Oran, J. P. Boris, and J. T. Mariska.* **265**, 1103, 24-G3 (1983)
- Millisecond Time Variations in Hard X-Ray Solar Flares. *Alan L. Kiplinger, B. R. Dennis, A. Gordon Emslie, K. J. Frost, and L. E. Orwig.* **265**, L99, 26-E11 (1983)
- First-Order Fermi Acceleration in Solar Flares as a Mechanism

- for the Second-Step Acceleration of Prompt Protons and Relativistic Electrons. *T. Bai, H. S. Hudson, R. M. Pelling, R. P. Lin, R. A. Schwartz, and T. T. von Rosenvinge.* **267**, 433, 44-E3 (1983)
- Microwave and Hard X-Ray Imaging of a Solar Flare on 1980 November 5. *P. Hoyng, K. A. Marsh, H. Zirin, and B. R. Dennis.* **268**, 865, 62-E5 (1983)
- X-Ray Line Ratios from Helium-like Ions: Updated Theory and SMM Flare Observations. *C. J. Wolfson, J. G. Doyle, J. W. Leibacher, and K. J. H. Phillips.* **269**, 319, 68-F2 (1983)
- The Impulsive Phase of Solar Flares. II. Characteristics of the Hard X-Rays. *John Leach and Vahé Petrosian.* **269**, 715, 74-C12 (1983)
- Evidence for Inhomogeneous Thermal Sources of Two Similar Solar Spike Events of 1978 May 5 and December 4. *H. J. Wiehl and U. Desai.* **270**, 256, 79-F7 (1983)
- Closed Coronal Structures. V. Gasdynamic Models of Flaring Loops and Comparison with SMM Observations. *R. Pallavicini, G. Peres, S. Serio, G. Vaiana, L. Acton, J. Leibacher, and R. Rosner.* **270**, 270, 79-G7 (1983)
- Hard X-Ray Imaging of a Solar Limb Flare with the X-Ray Telescope aboard the *Hinotori* Satellite. *T. Takakura, S. Tsuneta, K. Ohki, N. Nitta, K. Makishima, T. Murakami, Y. Ogawara, M. Oda, and S. Miyamoto.* **270**, L83, 87-D11 (1983)
- Radio Blips and Hard X-Rays in Solar Flares. *A. O. Benz, T. E. X. Bernold, and B. R. Dennis.* **271**, 355, 91-G6 (1983)
- Thick-Target Bremsstrahlung Interpretation of Short Time-Scale Solar Hard X-Ray Features. *A. Gordon Emslie.* **271**, 367, 92-A4 (1983)
- Acceleration and Confinement of Energetic Particles in the 1980 June 7 Solar Flare. *S. R. Kane, K. Kai, T. Kosugi, S. Enome, P. B. Landecker, and D. L. McKenzie.* **271**, 376, 92-A14 (1983)
- He D<sub>3</sub> as a Diagnostic for the Hard and Soft X-Rays from Solar Flares. *Uri Feldman, Margaret Liggett, and Harold Zirin.* **271**, 832, 98-E5 (1983)
- Associations between Coronal Mass Ejections and Soft X-Ray Events. *N. R. Sheeley, Jr., R. A. Howard, M. J. Koomen, and D. J. Michels.* **272**, 349, 104-G1 (1983)
- Recurrent Pulse Trains in the Solar Hard X-Ray Flare of 1980 June 7. *Alan L. Kiplinger, B. R. Dennis, K. J. Frost, and L. E. Orwig.* **273**, 783, 122-B6 (1983)
- Symbiotic Stars:** see **Stars: Combination Spectra**
- 3<sup>rd</sup> Cosmic Radiation:** see **Cosmic Background Radiation**
- Transition Probabilities**
- Oscillator Strengths and Collision Strengths for O II and O III. *Y. K. Ho and Ronald J. W. Henry.* **264**, 733, 10-C11 (1983)
- Theoretical Oscillator Strengths for 21 Spin-forbidden Lines of C, N, O, Al, and Si: Erratum. *Robert D. Cowan, L. M. Hobbs, and D. G. York.* **265**, 582, 18-C13 (1983) (Orig. paper in **257**, 373, 65-A7)
- Oscillator Strengths and Collision Strengths for S II. *Y. K. Ho and Ronald J. W. Henry.* **267**, 886, 50-D8 (1983)
- The <sup>1</sup>D-<sup>3</sup>P Transition in Atomic Oxygen Induced by Collisions with Atomic Hydrogen. *S. R. Federman and E. J. Shipsey.* **269**, 791, 75-B4 (1983)
- Oscillator Strengths of  $3p^3d^3D \rightarrow 3p^3d4s^3P^o, ^3D^o, ^3F^o$  Transitions in Cr VI, Mn VII, and Fe VIII. *S. N. Tiwary.* **269**, 803, 75-C2 (1983)
- Observationally Determined Fe II Oscillator Strengths. *J. Michael Shull, Michael Van Steenberg, and C. Gregory Seab.* **271**, 408, 92-D4 (1983)
- Scaling Laws for Hydrogen-like Atoms in Magnetic Fields of Arbitrary Strength. *J. M. Wadehra.* **271**, 879, 99-B1 (1983)
- A Theoretical Investigation of the Radiative Properties of the CN Red and Violet Systems. *Mats Larsson, Per E. M. Siegbahn, and Hans Ågren.* **272**, 369, 105-A10 (1983)
- Oscillator Strengths of  $3p^3d^3D \rightarrow 3p^3d4s^3P^o, ^3F^o$  Transitions in Co IX, Cu XI, and Zn XII Ions. *S. N. Tiwary.* **272**, 781, 110-C6 (1983)
- A Redetermination of the Solar Abundance of Molybdenum. *E. Biémont, N. Grevesse, P. Hannaford, R. M. Lowe, and W. Whaling.* **275**, 889, 147-C4 (1983)
- Electron Excitation Rates Among Fine Structure Levels in O III. *K. M. Aggarwal.* **52**, 387, 15-F1 (1983) (Abstr. in **270**, 779, 86-E6)
- T Tauri Stars:** see **Stars: Pre-Main-Sequence**
- Turbulence**
- Protostellar Rotation: Turbulence and Heating of Molecular Clouds. *José Franco.* **264**, 508, 7-G6 (1983)
- Multiscale Model Equations for Turbulent Convection and Convective Overshoot. *Philip S. Marcus, William H. Press, and Saul A. Teukolsky.* **267**, 795, 49-D12 (1983)
- Cosmic Turbulence and the Angular Momenta of Astronomical Systems: Erratum. *Robert C. Fleck, Jr.* **267**, 891, 50-D13 (1983) (Orig. paper in **261**, 631, 118-E11)
- Diode Laser Heterodyne Observations of Silicon Monoxide in Sunspots: A Test of Three Sunspot Models. *D. A. Glenar, D. Deming, D. E. Jennings, T. Kostiuik, and M. J. Mumma.* **269**, 309, 68-E4 (1983)
- Turbulent Resistive Heating of Solar Coronal Arches. *Gregory Benford.* **269**, 690, 74-A5 (1983)
- Dense Cores in Dark Clouds. III. Subsonic Turbulence. *P. C. Myers.* **270**, 105, 78-B4 (1983)
- Determination of the Properties of Magnetic Turbulence in Radio Sources. *Steven R. Spangler.* **271**, L49, 100-A8 (1983)
- A Note on Compressibility and Energy Cascade in Turbulent Molecular Clouds. *Robert C. Fleck, Jr.* **272**, L45, 111-A8 (1983)
- Ultraviolet: General**
- Discovery of a Nitrogen-rich UV-bright Star in the Globular Cluster M5. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, T. P. Stecher, and A. V. Sweigart.* **267**, L89, 51-B7 (1983)
- SOLRAD 11 Observations of the Far-Ultraviolet Background. *C. S. Weller.* **268**, 899, 63-A1 (1983)
- Ultraviolet Flux Distributions of Stars in the Orion Nebula Cluster. *Robert J. Panek.* **270**, 169, 78-F14 (1983)
- Ultraviolet Photometry of Dwarf Novae in Outburst. *Chi-Chao Wu and Robert J. Panek.* **271**, 754, 97-F7 (1983)
- Synthesis Maps of Ultraviolet Observations of Neutral Interstellar Gas. *P. C. Frisch and D. G. York.* **271**, L59, 100-B3 (1983)
- Coulomb Thermal Properties and Stability of the Io Plasma Torus. *D. D. Barbosa, F. V. Coroniti, and A. Eviatar.* **274**, 429, 128-D4 (1983)
- Images in the Rocket Ultraviolet: The Starburst in the Nucleus of M83. *R. C. Bohlin, R. H. Cornett, J. K. Hill, A. M. Smith, and T. P. Stecher.* **274**, L53, 136-A8 (1983)
- The S201 Far-Ultraviolet Imaging Survey. I. Two Fields at High Galactic Latitude. *George R. Carruthers and Thornton Page.* **53**, 623, 25-C1 (1983) (Abstr. in **273**, 841, 122-F11)
- Ultraviolet: Spectra**
- The Interstellar Medium near the Sun. III. Detailed Analysis of the Line of Sight to Lambda Scorpii. *Donald G. York.* **264**, 172, 2-F12 (1983)
- IUE Observations of Gas Stream Effects in the Ultraviolet Spectrum of U Cephei: Erratum. *Yoji Kondo, George E. McCluskey, and Robert E. Stencel.* **264**, 746, 10-D10 (1983) (Orig. paper in **233**, 906, 103-D11)
- HD 207739: A Strange Composite Star. *Sidney B. Parsons, Albert V. Holm, and Yoji Kondo.* **264**, L19, 5-B4 (1983)
- IUE Observations of Markarian 3 and 6: Reddening and the Nonstellar Continuum. *Matthew A. Malkan and J. B. Oke.* **265**, 92, 13-B1 (1983)

**Ultraviolet: Spectra—Continued**

- Absorption of Halo Gas in the Direction of M13. *Klaas S. de Boer and Blair D. Savage.* **265**, 210, 14-D8 (1983)
- The Planetary Nebula IC 3568: A Model Based on IUE Observations. *J. Patrick Harrington and Walter A. Feibelman.* **265**, 258, 15-A4 (1983)
- An Attempt to Determine Stellar Lyman-Alpha Emission-Line Fluxes for F Stars with Different Metal Abundances. *Erika Böhm-Vitense and Jack Woods.* **265**, 331, 15-F8 (1983)
- Ultraviolet Spectroscopy of V1341 Cygni (= Cygnus X-2). *L. Chiappetti, L. Maraschi, E. G. Tanzi, and A. Treves.* **265**, 354, 16-A5 (1983)
- Time-resolved Ultraviolet and Optical Spectroscopy of the Pulsating X-Ray Source H2252-035. *France A. Córdova, E. E. Fenimore, John Middleditch, and Keith O. Mason.* **265**, 363, 16-B1 (1983)
- Fluid Motions in the Solar Chromosphere-Corona Transition Region. I. Line Widths and Doppler Shifts for C iv. *R. G. Athay, J. B. Gurman, W. Henze, and R. A. Shine.* **265**, 519, 17-F3 (1983)
- Simultaneous Ultraviolet Line and Hard X-Ray Bursts in the Impulsive Phase of Solar Flares. *B. E. Woodgate, R. A. Shine, A. I. Poland, and L. E. Orwig.* **265**, 530, 17-G1 (1983)
- Theoretical Oscillator Strengths for 21 Spin-forbidden Lines of C, N, O, Al, and Si: Erratum. *Robert D. Cowan, L. M. Hobbs, and D. G. York.* **265**, 582, 18-C13 (1983) (Orig. paper in **257**, 373, 65-A7)
- Molecular Emission Bands in the Ultraviolet Spectrum of the Red Rectangle Star HD 44179. *Michael L. Sitko.* **265**, 848, 22-A10 (1983)
- Lyman-Alpha Observations of Comets West 1976 VI and P/ D'Arrest 1976 XI with Copernicus. *M. C. Festou, H. U. Keller, J.-L. Bertaux, and E. S. Barker.* **265**, 925, 23-A1 (1983)
- The Ultraviolet Spectra of Three N-Type Carbon Stars. *Hollis R. Johnson and George T. O'Brien.* **265**, 952, 23-B14 (1983)
- Impact Linear Polarization Observed in a UV Chromospheric Line during a Solar Flare. *J. C. Henoux, G. Chambe, M. Semel, S. Sahal, B. Woodgate, D. Shine, J. Beckers, and M. Machado.* **265**, 1066, 24-D5 (1983)
- Numerical Simulations of Loops Heated to Solar Flare Temperatures. II. X-Ray and UV Spectroscopy. *G. A. Doschek, Chung-Chieh Cheng, E. S. Oran, J. P. Boris, and J. T. Mariska.* **265**, 1103, 24-G3 (1983)
- Prominent Ultraviolet Emission Lines from Type I Seyfert Galaxies. *Chi-Chao Wu, Albert Boggess, and Theodore R. Gull.* **266**, 28, 27-C5 (1983)
- An Analysis of the Reflection Spectrum of Jupiter from 1500 Å to 1740 Å. *G. Randall Gladstone and Yuk L. Yung.* **266**, 415, 31-D6 (1983)
- X-Ray and Ultraviolet Observations of Extragalactic H II Regions. *G. Fabbiano and N. Panagia.* **266**, 568, 34-D12 (1983)
- Peculiar Ultraviolet Interstellar Extinction. *Derck Massa, Blair D. Savage, and Edward L. Fitzpatrick.* **266**, 662, 35-D14 (1983)
- The Angular Diameters, Effective Temperatures, Radii, and Luminosities of 10 Wolf-Rayet Stars. *Anne B. Underhill.* **266**, 718, 36-B10 (1983)
- Mass Loss in HR 1040 (A0 Ia): Analysis of Mg II  $\lambda$ 2802 and H $\alpha$ . *Paul B. Kunasz, Nancy D. Morrison, and B. Sprengart.* **266**, 739, 36-D4 (1983)
- International Ultraviolet Explorer Observations of the Peculiar Variable Spectrum of the Eclipsing Binary R Arae. *George E. McCluskey and Yoji Kondo.* **266**, 755, 36-E6 (1983)
- Iron and Magnesium in the White Dwarf GD 40: A Test of Diffusion Theory. *Harry L. Shipman and Jesse L. Greenstein.* **266**, 761, 36-E12 (1983)
- Formation of the C I  $\lambda$  Lines at 1351 Å in the Solar Chromosphere. *R. A. Shine.* **266**, 882, 38-A5 (1983)
- IUE Observations of E1405-451: A New AM Herculis Type Cataclysmic Variable. *J. A. Nousek and S. H. Pravdo.* **266**, L39, 32-C8 (1983)
- Outflow from the Sun's Polar Corona. *F. Q. Orrall, G. J. Rottman, and J. A. Klimchuk.* **266**, L65, 32-E3 (1983)
- Far-Ultraviolet Diffuse Emission Lines from the Interstellar Medium. *Francesco Paresce, Brunella C. Monsignori Fossi, and Massimo Landini.* **266**, L107, 39-C7 (1983)
- Ultraviolet Interstellar Absorption toward HD 5980 in the Small Magellanic Cloud. *Edward L. Fitzpatrick and Blair D. Savage.* **267**, 93, 41-A6 (1983)
- Coordinated Einstein and IUE Observations of a Disruptions Brusques Type Flare Event and Quiescent Emission from Proxima Centauri. *Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana.* **267**, 280, 43-A1 (1983)
- Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. *M. Garcia, S. L. Baliunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson.* **267**, 291, 43-A13 (1983)
- The Ultraviolet Spectrum of the Seyfert Galaxies NGC 3516 and NGC 5548. *M. H. Ulrich and C. Boisson.* **267**, 515, 46-D13 (1983)
- The Ionization Structure of Planetary Nebulae. III. NGC 7009. *Timothy Barker.* **267**, 630, 47-F4 (1983)
- The Role of Spicules in Heating the Solar Atmosphere: Implications of EUV Observations. *George L. Withbroe.* **267**, 825, 49-F14 (1983)
- The Diffuse Interstellar Feature at 4430 Å and Interstellar Extinction in the Far-Ultraviolet. *Adolf N. Witt, Ralph C. Bohlin, and Theodore P. Stecher.* **267**, L47, 45-E8 (1983)
- Chromospheric Jets: Possible Extreme-Ultraviolet Observations of Spicules. *K. P. Dere, J.-D. F. Bartoe, and G. E. Brueckner.* **267**, L65, 45-F10 (1983)
- Rocket Detection of Ultraviolet Emission from Neutral Oxygen and Sulfur in the Io Torus. *S. T. Durrance, P. D. Feldman, and H. A. Weaver.* **267**, L125, 51-D14 (1983)
- Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. *Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers.* **268**, 205, 54-B14 (1983)
- Infall and Outflow of S<sup>+</sup> Ions in 15 Monocerotis, Tau Canis Majoris, and Iota Orionis. *Donald C. Morton.* **268**, 217, 54-C12 (1983)
- Observational Studies of the Symbiotic Stars. II. Emission-Line Relative Intensity Variations in CI Cygni, BF Cygni, AX Persei, and V1016 Cygni. *Nancy A. Oliverson and Christopher M. Anderson.* **268**, 250, 54-F3 (1983)
- Observations of Ultraviolet Carbon Lines in the Spectra of Three DC White Dwarfs. *G. Wegner.* **268**, 282, 55-A9 (1983)
- Structure and Spectrum of Quiescent Prominences. IV. The Ultraviolet Ionization Continua of Hydrogen and Helium. *J. N. Heasley and R. W. Milkey.* **268**, 398, 56-C1 (1983)
- The Ultraviolet Excess of Luminous Quasars. II. Evidence for Massive Accretion Disks. *Matthew A. Malkan.* **268**, 582, 59-D4 (1983)
- Chromospheric Emission of W Ursae Majoris-Type Stars and Its Relation to the Structure of Their Common Envelopes. *Joel A. Eaton.* **268**, 800, 61-G8 (1983)
- Episodic Mass Loss and Narrow Lines in Gamma Cassiopeiae and in Other Early-Type Stars. *H. F. Henrichs, G. Hamerschlag-Hensberge, I. D. Howarth, and P. Barr.* **268**, 807, 62-A1 (1983)
- Ultraviolet Continuum and H<sub>2</sub> Fluorescent Emission in Herbig-Haro Objects 43 and 47. *Richard D. Schwartz.* **268**, L37, 57-C14 (1983)



- Possible Evidence for the Driving of the Winds of Hot Stars by Alfvén Waves. *Anne B. Underhill*. **268**, L127, 64-B1 (1983)
- The Binary Central Star of the Planetary Nebula LT-5. *Walter A. Feibelman and James B. Kaler*. **269**, 592, 72-G11 (1983)
- Mass Loss, Levitation, Accretion, and the Sharp-Lined Features in Hot White Dwarfs. *Frederick C. Bruhweiler and Yoji Kondo*. **269**, 657, 73-E14 (1983)
- High-Velocity Iron Absorption Lines in Supernova Remnant 1006. *Chi-Chao Wu, Marvin Leventhal, Craig L. Sarazin, and Theodore R. Gull*. **269**, L5, 69-A7 (1983)
- The Partial Phase of the Eclipse of Epsilon Aurigae. *Robert D. Chapman, Yoji Kondo, and Robert E. Stencel*. **269**, L17, 69-B3 (1983)
- Detection of Auroral Hydrogen Lyman-Alpha Emission from Uranus: Erratum. *John T. Clarke*. **269**, L25, 69-B9 (1983) (Orig. paper in **263**, L105, 143-E8)
- Copernicus Observations of C I: Pressures and Carbon Abundances in Diffuse Interstellar Clouds. *Edward B. Jenkins, Michael Jura, and Michael Loewenstein*. **270**, 88, 78-A1 (1983)
- IUE Observations of the Perplexing Bipolar Planetary Nebula NGC 2346. *Walter A. Feibelman and Lawrence H. Aller*. **270**, 150, 78-E6 (1983)
- Constraints on the Inclination and Masses of the HDE 226868/Cygnus X-1 System from the Observations. *R. Davis and L. Hartmann*. **270**, 671, 85-D7 (1983)
- The Narrow Ultraviolet Emission Lines of the Red Dwarf AU Microscopii (dM1.6c). *Thomas R. Ayres, Kjell Eriksson, Jeffrey L. Linsky, and R. E. Stencel*. **270**, L17, 80-B4 (1983)
- On the Contributions of the Orion Reflection Nebulosity to the Continuous UV Spectrum of the Herbig-Haro Objects HH 1 and HH 2 and of the C-S Star. *Reinhard Mundt and Adolf N. Witt*. **270**, L59, 87-C6 (1983)
- Observationally Determined Fe II Oscillator Strengths. *J. Michael Shull, Michael Van Steenberg, and C. Gregory Seab*. **271**, 408, 92-D4 (1983)
- Chromospheric and Coronal Emissions from the Giants in the Hyades. *S. L. Balunas, L. Hartmann, and A. K. Dupree*. **271**, 672, 96-G4 (1983)
- Observations of Off-Star Wind Variability. *C. A. Grady, T. P. Snow, Jr., and J. G. Timothy*. **271**, 691, 97-A13 (1983)
- The Circumstellar Dust of Mu Cephei. *C. Rogers, P. G. Martin, and Dennis R. Crabtree*. **272**, 175, 103-A1 (1983)
- RW Tauri as a Weak W Serpentis Star. *Mirek J. Plavec and Jan J. Dobias*. **272**, 206, 103-C6 (1983)
- Outer Atmospheres of Cool Stars. XIII. Capella at Critical Phases. *Thomas R. Ayres, Francis H. Schiffer III, and Jeffrey L. Linsky*. **272**, 223, 103-D9 (1983)
- A Far-Ultraviolet Extinction Law: What Does It Mean? *J. Mayo Greenberg and Grzegorz Chlewicki*. **272**, 563, 108-A6 (1983)
- Element Identifications in the Ultraviolet Spectrum of HD 101065. *G. Wegner, D. J. Cummins, P. B. Byrne, and D. J. Stickland*. **272**, 646, 108-G5 (1983)
- Outer Atmospheres of Cool Stars. XIV. A Model for the Chromosphere and Transition Region of Beta Ceti (G9.5 III). *Kjell Eriksson, Jeffrey L. Linsky, and Theodore Simon*. **272**, 665, 109-A13 (1983)
- Spectral Evolution of Galaxies. I. Early-Type Systems. *Gustavo Bruzual A.* **273**, 105, 113-C6 (1983)
- The Extreme LMC Supergiant HD 38489: An Optical and Ultraviolet Study. *Steven N. Shore and N. Sanduleak*. **273**, 177, 114-B8 (1983)
- The Nature of R136a, the Superluminous Central Object of the 30 Doradus Nebula. *Blair D. Savage, Edward L. Fitzpatrick, Joseph P. Cassinelli, and Dennis C. Ebets*. **273**, 597, 120-B1 (1983)
- Lines of Fe XII Sensitive to Coronal Electron Density. *U. Feldman, Leonard Cohen, and G. A. Doschek*. **273**, 822, 122-E4 (1983)
- Star Formation in Blue Galaxies. I. Ultraviolet, Optical, and Infrared Observations of NGC 4214 and NGC 4670. *John P. Huchra, Margaret J. Geller, Jay Gallagher, Deidre Hunter, Lee Hartmann, Giuseppina Fabbiano, and Marc Aaronson*. **274**, 125, 125-C5 (1983)
- The Resonance Lines of Aluminum in IUE Spectra of B-Type Chemically Peculiar Stars. *Kozo Sadakane, Masahide Takada, and Jun Jugaku*. **274**, 261, 126-F2 (1983)
- Si III Line Ratios in the Sun. *P. L. Dufton, A. E. Kingston, and G. A. Doschek*. **274**, 420, 128-C9 (1983)
- O IV Temperature Determination for NGC 7662. *M. A. Shure, T. Herzer, and J. R. Houck*. **274**, 646, 132-D11 (1983)
- Outer Atmospheres of Cool Stars. XV. High-Dispersion Ultraviolet Studies of Active Chromosphere G-K Dwarfs. *Thomas R. Ayres, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, and Alexander Brown*. **274**, 784, 134-A1 (1983)
- Redshifts of High-Temperature Emission Lines in the Far-Ultraviolet Spectra of Late-Type Stars. *Thomas R. Ayres, Robert E. Stencel, Jeffrey L. Linsky, Theodore Simon, Carole Jordan, Alexander Brown, and Oddbjorn Engvold*. **274**, 801, 134-B5 (1983)
- High-Velocity Absorbing Cloudlets as Potential Contributors to Observed Quasar Continua. *Ronald G. Eastman, Gordon M. MacAlpine, and Douglas O. Richstone*. **275**, 53, 137-E3 (1983)
- The Cool DC White Dwarf Stein 2051B. *Gary Wegner and F. H. Yackovich*. **275**, 240, 139-F3 (1983)
- Far-Ultraviolet Emission Lines in U Cephei: Evidence for a Hot, Turbulent Circumstellar Envelope. *Mirek J. Plavec*. **275**, 251, 139-F14 (1983)
- The 1982 Ultraviolet Eclipse of the Symbiotic Binary AR Pavonis. *J. B. Hutchings, A. P. Cowley, T. B. Ake, and C. L. Imhoff*. **275**, 271, 140-A6 (1983)
- IUE Observations of the Exciting Stars of Giant H II Regions in M33: Supermassive Stars? *Philip Massey and J. B. Hutchings*. **275**, 578, 143-G9 (1983)
- Observations of Two Peculiar Emission Objects in the Large Magellanic Cloud. *M. Kafatos, A. G. Michalitsianos, D. A. Allen, and R. E. Stencel*. **275**, 584, 144-A1 (1983)
- Ultraviolet Observations of M1-2 (= VV 8). *Walter A. Feibelman*. **275**, 628, 144-D9 (1983)
- The Structure and Emission Spectrum of a Nonradiative Shock Wave in the Cygnus Loop. *J. C. Raymond, W. P. Blair, R. A. Fesen, and T. R. Gull*. **275**, 636, 144-E3 (1983)
- Shock Processing of Interstellar Grains. *C. Gregory Seab and J. Michael Shull*. **275**, 652, 144-F5 (1983)
- Observations of Active Chromosphere Stars. *Bernard W. Bopp, John L. Africano, R. E. Stencel, P. V. Noah, and A. Klimke*. **275**, 691, 145-B2 (1983)
- Skylab Observations of the Solar C I Multiplets at  $\lambda 1560$  and  $\lambda 1657$ . *D. Roussel-Dupré*. **275**, 892, 147-C7 (1983)
- IUE Spectrum of the Io Torus: Identification of the  $^3S_2 \rightarrow ^3P_{2,1}$  Transitions of S III. *H. W. Moos, S. T. Durrance, T. E. Skinner, P. D. Feldman, J.-L. Bertaux, and M. C. Festou*. **275**, L19, 141-G4 (1983)
- White Dwarfs and the Interstellar Medium. *A. K. Dupree and J. C. Raymond*. **275**, L71, 148-D10 (1983)
- A Survey of Ultraviolet Interstellar Absorption Lines. *Ralph C. Bohlin, Jesse K. Hill, Edward B. Jenkins, Blair D. Savage, Theodore P. Snow, Jr., Lyman Spitzer, Jr., and Donald G. York*. **51**, 277, 6-B1 (1983) (Abstr. in **265**, 1135, 25-B11)
- The Solar O III Spectrum. II. Longer Wavelengths, Line Widths, and the He II Lyman  $\alpha$  Radiation Field. *S. O. Kastner, W. E. Behring, and A. K. Bhatia*. **53**, 129, 18-C6 (1983) (Abstr. in **271**, 892, 99-B14)
- Spectral Evolution of Galaxies. III. Cosmological Predictions for the Space Telescope Faint Object Camera. *Gustavo Bru-*

**Ultraviolet: Spectra—Continued**

- zual A.* **53**, 497, 23-E2 (1983) (Abstr. in **272**, 787, 110-C12)  
 Ultraviolet Spectroscopic Observations of Some Be Stars of Later Type and A-F Type Shell Stars. *Arne Slettebak and Kenneth G. Carpenter.* **53**, 869, 28-G1 (1983) (Abstr. in **274**, 923, 135-E4)

**W Virginis Stars: see Stars: Cepheids****X-Rays: Binaries**

- Observations of Centaurus X-3 by *Hakucho*. *T. Murakami, H. Inoue, N. Kawai, K. Koyama, K. Makishima, M. Matsuoka, M. Oda, Y. Ogawara, T. Ohashi, N. Shibasaki, Y. Tanaka, S. Hayakawa, H. Kunieda, F. Makino, K. Masai, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Yamashita, and I. Kondo.* **264**, 563, 8-D8 (1983)  
 Discovery of 13.5 s X-Ray Pulsations from LMC X-4 and an Orbital Determination. *R. L. Kelley, J. G. Jernigan, A. Levine, L. D. Petro, and S. Rappaport.* **264**, 568, 8-D13 (1983)  
 Optical Identification of the X-Ray Source E1405-451: A 101.5 Minute Binary System with Extremely Rapid Quasi-periodic Variability. *K. O. Mason, J. Middleditch, F. A. Córdova, K. A. Jensen, G. Reichert, P. G. Murdin, D. Clark, and S. Bowyer.* **264**, 575, 8-E6 (1983)  
 Radio Frequency Observations of Galactic X-Ray Sources. *B. J. Geldzahler.* **264**, L49, 11-B6 (1983)  
 Ultraviolet Spectroscopy of V1341 Cygni (=Cygnus X-2). *L. Chiappetti, L. Maraschi, E. G. Tanzi, and A. Treves.* **265**, 354, 16-A5 (1983)  
 Time-resolved Ultraviolet and Optical Spectroscopy of the Pulsating X-Ray Source H2252-035. *France A. Córdova, E. E. Fenimore, John Middleditch, and Keith O. Mason.* **265**, 363, 16-B1 (1983)  
 A Feature in the X-Ray Spectrum of Cygnus X-1: A Possible Positron Annihilation Line. *P. L. Nolan and J. L. Matteson.* **265**, 389, 16-C13 (1983)  
 The Eddington Limit and Supercritical Accretion. II. Time-dependent Calculations. *H. L. Burger and J. I. Katz.* **265**, 393, 16-D3 (1983)  
 Spectral and Temporal Effects of a Plasma Shell around an X-Ray Source. *Kar Man Chang and Nikolaos D. Kylafis.* **265**, 1005, 23-F11 (1983)  
 Masses, Radii, and Magnetic Fields of Pulsating X-Ray Sources: Is the "Standard" Model Self-consistent? *Ira Wasserman and Stuart L. Shapiro.* **265**, 1036, 24-B2 (1983)  
 Accretion onto Magnetized Neutron Stars: X-Ray Pulsars with Intermediate Rotation Rates. *David J. Burnard, Susan M. Lea, and Jonathan Arons.* **266**, 175, 28-G10 (1983)  
 X-Ray Observations of 4U 1626-67 by the Monitor Counter on the Einstein (HEAO 2) Observatory. *R. F. Elsner, W. Darbro, D. Leahy, M. C. Weisskopf, P. G. Sutherland, S. M. Kahn, and J. E. Grindlay.* **266**, 769, 36-F6 (1983)  
 Conservative Mass Transfer in Close Binary Systems. I. Equations of Motion for Spin and Orbital Angular Momenta. *John J. Matese and Daniel P. Whitmire.* **266**, 776, 36-F13 (1983)  
 High-Energy X-Ray Observations of Vela X-1. *M. Bautz, S. Howe, A. Gorecki, F. Lang, A. Levine, F. Primini, and W. H. G. Lewin.* **266**, 794, 37-A8 (1983)  
 The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae). *G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen.* **266**, 806, 37-B10 (1983)  
 A Two-Component X-Ray Spectrum from SMC X-1. *F. E. Marshall, N. E. White, and R. H. Becker.* **266**, 814, 37-C4 (1983)  
 Periodic Variability of the X-Ray Nova A0620-00 in Quiescence. *J. E. McClintock, L. D. Petro, R. A. Remillard, and G. R. Ricker.* **266**, L27, 32-B12 (1983)  
 Accreting X-Ray Pulsar Atmospheres Heated by Coulomb Deceleration of Protons. *P. Mészáros, A. K. Harding, J. G. Kirk, and D. J. Galloway.* **266**, L33, 32-C3 (1983)  
 Identification and Properties of the M Giant/X-Ray System HD 154791 = 2A 1704+241. *M. Garcia, S. L. Balunas, R. Doxsey, M. Elvis, G. Fabbiano, G. Koenigsberger, J. Patterson, D. Schwartz, J. Swank, and M. G. Watson.* **267**, 291, 43-A13 (1983)  
 First Observations of Stellar Coronal Structure: The Coronae of AR Lacertae. *Frederick M. Walter, David M. Gibson, and Gabor S. Basri.* **267**, 665, 48-A13 (1983)  
 Time-resolved Spectrophotometry of the Emission Lines in the Galactic X-Ray Source H2252-035. *John T. Clarke, Keith O. Mason, and Stuart Bowyer.* **267**, 726, 48-F8 (1983)  
 X-Ray Evidence for White Dwarf Binaries in Globular Clusters. *Paul Hertz and Jonathan E. Grindlay.* **267**, L83, 51-B2 (1983)  
 X-Ray Properties of the Be/X-Ray System 2S 0114+650 = LSI +65°010. *G. Koenigsberger, J. H. Swank, A. E. Szymkowiak, and N. E. White.* **268**, 782, 61-F4 (1983)  
 Orbital Period Changes in Centaurus X-3. *R. L. Kelley, S. Rappaport, G. W. Clark, and L. D. Petro.* **268**, 790, 61-F12 (1983)  
 The X-Ray Absorption Spectrum of 4U 1700-37 and Its Implications for the Stellar Wind of the Companion HD 153919. *N. E. White, T. R. Kallman, and J. H. Swank.* **269**, 264, 68-A13 (1983)  
 The Correlated X-Ray and Optical Time Variability of TT Arietis. *K. A. Jensen, France A. Córdova, J. Middleditch, Keith O. Mason, A. D. Grauer, Keith Horne, and Richard Gomer.* **270**, 211, 79-B14 (1983)  
 Irregular X-Ray Variability in the Transient X-Ray Burst Source MXB 1659-29. *L. Cominsky, W. Ossman, and W. H. G. Lewin.* **270**, 226, 79-D1 (1983)  
 Evidence for an ~300 Day Period in Cygnus X-1. *W. C. Priedhorsky, J. Terrell, and S. S. Holt.* **270**, 233, 79-D10 (1983)  
 The Broad-Band X-Ray Spectrum of Cygnus X-2. *Steven H. Pravdo.* **270**, 239, 79-E2 (1983)  
 Measurement of Coronal X-Ray Emission Lines from Capella. *Peter W. Vedder and Claude R. Canizares.* **270**, 666, 85-D2 (1983)  
 Constraints on the Inclination and Masses of the HDE 226868/Cygnus X-1 System from the Observations. *R. Davis and L. Hartmann.* **270**, 671, 85-D7 (1983)  
 On the Evolutionary Status of Bright, Low-Mass X-Ray Sources. *R. F. Webbink, S. Rappaport, and G. J. Savonije.* **270**, 678, 85-E1 (1983)  
 Accretion Powered X-Ray Pulsars. *N. E. White, J. H. Swank, and S. S. Holt.* **270**, 711, 85-G7 (1983)  
 Discovery of Eclipses in the X-Ray Source HD 155638. *Raymond H. Bloomer, Jr., Wayne A. Hanson, Robert E. Fried, Douglas S. Hall, and Gregory W. Henry.* **270**, L79, 87-D8 (1983)  
 Compton Heated Winds and Coronae above Accretion Disks. I. Dynamics. *Mitchell C. Begelman, Christopher F. McKee, and Gregory A. Shields.* **271**, 70, 88-F9 (1983)  
 Compton Heated Winds and Coronae above Accretion Disks. II. Radiative Transfer and Observable Consequences. *Mitchell C. Begelman and Christopher F. McKee.* **271**, 89, 89-A1 (1983)  
 Gamma-Rays and the Production of Energetic Electrons in Enshrouding Material: A Model for the Quiescent Radio Emission from Cygnus X-3. *W. Thomas Vestrand.* **271**, 304, 91-C9 (1983)  
 Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. *J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radostitz, W. C. Priedhorsky, J. Terrell, and E. N. Walker.* **271**, L65, 100-B8 (1983)  
 Discovery of a Massive Unseen Star in LMC X-3. *A. P. Cowley, D. Crampton, J. B. Hutchings, R. Remillard, and J. E. Penfold.* **272**, 118, 102-C13 (1983)

- HEAO 1 High-Energy X-Ray Observations of Centaurus X-3.** S. K. Howe, F. A. Primini, M. W. Bautz, F. L. Lang, A. M. Levine, and W. H. G. Lewin. **272**, 678, 109-B12 (1983)
- The X-Ray Lobes of SS 433.** M. G. Watson, R. Willingale, J. E. Grindlay, and F. D. Seward. **273**, 688, 121-B6 (1983)
- Long-Term X-Ray Observations of Centaurus X-3.** GX 301-2 (4U 1223-62), GX 304-1 (4U 1258-61), and 4U 1145-61. W. C. Priedhorsky and J. Terrell. **273**, 709, 121-C14 (1983)
- On the Clock Mechanism and the Implausibility of the 35 Day Precessing Disk in HZ Herculis/Hercules X-1.** Yoji Kondo, Thomas C. Van Flandern, and Charles L. Wolff. **273**, 716, 121-D8 (1983)
- The 1982 September Radio Outburst of Cygnus X-3: Evidence for Jetlike Emission Expanding at  $\approx 0.35$  c.** B. J. Geldzahler, K. J. Johnston, J. H. Spencer, W. J. Klepczynski, F. J. Josties, P. E. Angerhofer, D. R. Florkowski, D. D. McCarthy, D. N. Matsakis, and R. M. Hjellming. **273**, L65, 123-B3 (1983)
- Mass of Large Magellanic Cloud X-3.** Bohdan Paczyński. **273**, L81, 123-C3 (1983)
- Infrared and Optical Pulsations from HZ Herculis and Possible 3.5 Second Infrared Pulsations from 1E 2259+586.** J. Middleditch, C. R. Pennypacker, and M. S. Burns. **274**, 313, 127-B14 (1983)
- Long-Term, Hard X-Ray Observations of Scorpius X-1 from HEAO 1.** Y. Soong and R. E. Rothschild. **274**, 327, 127-C14 (1983)
- Observations of a Hard X-Ray Component in the Spectrum of Nova Ophiuchi.** C. K. Wilson and R. E. Rothschild. **274**, 717, 133-C2 (1983)
- Discovery of 9.3 s X-Ray Pulsations from 2S 1553-542 and a Determination of the Orbit.** R. L. Kelley, S. Rappaport, and S. Ayasli. **274**, 765, 133-F8 (1983)
- Synchronization of Magnetic Stars in Binary Systems.** F. K. Lamb, J.-J. Aly, M. C. Cook, and D. Q. Lamb. **274**, L71, 136-B12 (1983)
- An X-Ray Survey of Globular Clusters and Their X-Ray Luminosity Function.** Paul Hertz and Jonathan E. Grindlay. **275**, 105, 138-B13 (1983)
- Optical Pulsations from HZ Herculis/Hercules X-1: The Self-consistent 35 Day Picture.** John Middleditch. **275**, 278, 140-A14 (1983)
- The State of Cygnus X-1.** J. C. Ling, W. A. Mahoney, W. A. Wheaton, A. S. Jacobson, and L. Kaluzienski. **275**, 307, 140-D1 (1983)
- Linear Polarization Measurements of the AM Herculis Objects H0139-68 and E1405-451.** N. Visvanathan and I. Tuohy. **275**, 709, 145-C6 (1983)
- Limits to the Rate of Component Separation in Scorpius X-1.** E. B. Fomalont, B. J. Geldzahler, R. M. Hjellming, and C. M. Wade. **275**, 802, 146-C11 (1983)
- X-Rays: Bursts**
- A One-Zone Model for Shell Flashes on Accreting Compact Stars.** Bohdan Paczyński. **264**, 282, 4-A1 (1983)
- The Thermonuclear Model for X-Ray Transients: Erratum.** R. K. Wallace, S. E. Woosley, and Thomas A. Weaver. **264**, 746, 10-D10 (1983) (Orig. paper in **258**, 696, 81-A1)
- Radio Frequency Observations of Galactic X-Ray Sources.** B. J. Geldzahler. **264**, L49, 11-B6 (1983)
- Simultaneous Ultraviolet Line and Hard X-Ray Bursts in the Impulsive Phase of Solar Flares.** B. E. Woodgate, R. A. Shine, A. I. Poland, and L. E. Orwig. **265**, 530, 17-G1 (1983)
- The 1980 Outburst of 4U 0115+63 (V635 Cassiopeiae).** G. A. Kriss, L. R. Cominsky, R. A. Remillard, G. Williams, and J. R. Thorstensen. **266**, 806, 37-B10 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26).** K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsuoka, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibasaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kuniyoshi, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- Models of X-Ray Bursters with Radius Expansion.** Bohdan Paczyński. **267**, 315, 43-C11 (1983)
- X-Ray Burst Observations of Serpens X-1.** M. Sztajno, E. M. Zasinska, L. R. Cominsky, F. J. Marshall, and W. H. G. Lewin. **267**, 713, 48-E7 (1983)
- X-Ray Properties of the Be/X-Ray System 2S 0114+650 = LSI + 65°010.** G. Koenigsberger, J. H. Swank, A. E. Szymkowiak, and N. E. White. **268**, 782, 61-F4 (1983)
- H0547-14: X-Ray Flux from a Weak Gamma-Ray Burst?** C. Ambruster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman. **269**, 779, 75-A6 (1983)
- Irregular X-Ray Variability in the Transient X-Ray Burst Source MXB 1659-29.** L. Cominsky, W. Ossman, and W. H. G. Lewin. **270**, 226, 79-D1 (1983)
- Thick-Target Bremsstrahlung Interpretation of Short Time-Scale Solar Hard X-Ray Features.** A. Gordon Emslie. **271**, 367, 92-A4 (1983)
- Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53.** A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsuoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs. **271**, 793, 98-B8 (1983)
- X-Rays: General**
- Accurate Formula for the Self-Compton X-Ray Flux Density from a Uniform, Spherical, Compact Radio Source.** Alan P. Marscher. **264**, 296, 4-B1 (1983)
- X-Ray Evidence for White Dwarf Binaries in Globular Clusters.** Paul Hertz and Jonathan E. Grindlay. **267**, L83, 51-B2 (1983)
- Analysis of Complete Quasar Samples to Obtain Parameters of Luminosity and Evolution Functions.** H. L. Marshall, Y. Avni, H. Tananbaum, and G. Zamorani. **269**, 35, 65-D2 (1983)
- Optical and X-Ray Observations of Faint Quasars in an Optically Selected Sample.** H. L. Marshall, H. Tananbaum, G. Zamorani, J. P. Huchra, A. Braccetti, and V. Zitelli. **269**, 42, 65-D9 (1983)
- The Soft X-Ray Diffuse Background.** D. McCammon, D. N. Burrows, W. T. Sanders, and W. L. Kraushaar. **269**, 107, 66-B4 (1983)
- Interstellar Photoelectric Absorption Cross Sections, 0.03-10 keV.** Robert Morrison and Dan McCammon. **270**, 119, 78-C4 (1983)
- X-Ray Emission from Pre-Main-Sequence Stars, Molecular Clouds, and Star Formation.** Joseph Silk and Colin Norman. **272**, L49, 111-A12 (1983)
- Evidence for X-Ray Scattering by Interstellar Dust.** R. C. Catura. **275**, 645, 144-E12 (1983)
- X-Ray Emission of Late-Type Stars.** L. Paternò and F. Zuccarello. **275**, L1, 141-F2 (1983)
- X-Rays: Sources**
- The Absence of Rapid X-Ray Variability in Active Galaxies.** Allyn F. Tennant and R. F. Mushotzky. **264**, 92, 2-A1 (1983)
- The X-Ray Surface Brightness of Kepler's Supernova Remnant.** Richard L. White and Knox S. Long. **264**, 196, 3-A10 (1983)
- Galaxy Clusters with Multiple Components. II.** Abell 115. Timothy C. Beers, John P. Huchra, and Margaret J. Geller. **264**, 356, 6-B12 (1983)
- A Multiwavelength Comparison of Cassiopeia A and Tycho's Supernova Remnant: Erratum.** John R. Dickel, Stephen S. Murray, Jeffrey Morris, and Donald C. Wells. **264**, 746, 10-D10 (1983) (Orig. paper in **257**, 145, 62-E6)
- The Nuclear Radio Source of the X-Ray Galaxy NGC 2110.** James S. Ulvestad and Andrew S. Wilson. **264**, L7, 5-A8 (1983)

## X-Rays: Sources—Continued

- H0323 + 022: A Puzzling High-Latitude X-Ray/Optical/Radio Source. R. Doxsey, H. Bradt, J. McClintock, L. Petro, R. Remillard, G. Ricker, D. Schwartz, and K. Wood. **264**, L43, 11-A14 (1983)
- Radio Frequency Observations of Galactic X-Ray Sources. B. J. Geldzahler. **264**, L49, 11-B6 (1983)
- A Giant X-Ray Flare in the Hyades. Robert A. Stern, James H. Underwood, and Spiro K. Antiochos. **264**, L55, 11-B11 (1983)
- H2215 - 086: King of the DQ Herculis Stars. Joseph Patterson and J. E. Steiner. **264**, L61, 11-C2 (1983)
- The X-Ray Morphology of Abell 1367. J. Bechtold, W. Forman, R. Giacconi, C. Jones, J. Schwarz, W. Tucker, and L. Van Speybroeck. **265**, 26, 12-C7 (1983)
- On Searches for Pulsed Emission with Application to Four Globular Cluster X-Ray Sources: NGC 1851, 6441, 6624, and 6712. D. A. Leahy, W. Darbro, R. F. Elsner, M. C. Weisskopf, P. G. Sutherland, S. Kahn, and J. E. Grindlay. **266**, 160, 28-F9 (1983)
- Einstein Observations of Three Classical Cepheids. Erika Böhm-Vitense and Sidney B. Parsons. **266**, 171, 28-G6 (1983)
- The Mass of Tycho's Supernova Remnant as Determined from a High-Resolution X-Ray Map. F. Seward, P. Gorenstein, and W. Tucker. **266**, 287, 30-A14 (1983)
- A Survey by HEAO 1 of Clusters of Galaxies. III. The Complete Abell Catalog. M. W. Johnson, R. G. Cruddace, M. P. Ulmer, M. P. Kowalski, and K. S. Wood. **266**, 425, 33-A5 (1983)
- Studies of BL Lacertae Objects with the Einstein X-Ray Observatory: The Absolute Volume Density. Daniel A. Schwartz and William H.-M. Ku. **266**, 459, 33-C13 (1983)
- Nearby Galaxies with Seyfert-like Nuclei. M. M. Phillips, P. A. Charles, and J. A. Baldwin. **266**, 485, 33-E11 (1983)
- X-Ray and Ultraviolet Observations of Extragalactic H II Regions. G. Fabbiano and N. Panagia. **266**, 568, 34-D12 (1983)
- High-Resolution Radio and X-Ray Observations of the Supernova Remnant W28. M. D. Andrews, J. P. Basart, R. C. Lamb, and R. H. Becker. **266**, 684, 35-F8 (1983)
- X-Ray Observations of the Antennae (NGC 4038/39). G. Fabbiano and G. Trinchieri. **266**, L5, 32-A5 (1983)
- Periodic Variability of the X-Ray Nova A0620-00 in Quiescence. J. E. McClintock, L. D. Petro, R. A. Remillard, and G. R. Ricker. **266**, L27, 32-B12 (1983)
- Accreting X-Ray Pulsar Atmospheres Heated by Coulomb Deceleration of Protons. P. Mészáros, A. K. Harding, J. G. Kirk, and D. J. Galloway. **266**, L33, 32-C3 (1983)
- The Cosmological Evolution and Luminosity Function of X-Ray Selected Active Galactic Nuclei. T. Maccacaro, Y. Avni, I. M. Gioia, P. Giommi, R. E. Griffiths, J. Liebert, J. Stocke, and J. Danziger. **266**, L73, 39-A4 (1983)
- A Wind and Shock Model for Active Galactic Nuclei. M. Camenzind and Thierry J.-L. Courvoisier. **266**, L83, 39-A13 (1983)
- Rapid Rotation and Stellar Activity in the Triple System HD 165590. Robert A. Stern and Andrew Skumanich. **267**, 232, 42-D8 (1983)
- Coordinated Einstein and IUE Observations of a Disruptions Brusques Type Flare Event and Quiescent Emission from Proxima Centauri. Bernhard M. Haisch, Jeffrey L. Linsky, P. L. Bornmann, Robert E. Stencel, Spiro K. Antiochos, Leon Golub, and G. S. Vaiana. **267**, 280, 43-A1 (1983)
- Discovery of X-Ray Bursts from GX 3+1 (4U 1744-26). K. Makishima, K. Mitsuda, H. Inoue, K. Koyama, M. Matsumoto, T. Murakami, M. Oda, Y. Ogawara, T. Ohashi, N. Shibasaki, Y. Tanaka, F. J. Marshall, S. Hayakawa, H. Kunieda, F. Makino, F. Nagase, Y. Tawara, S. Miyamoto, H. Tsunemi, K. Tsuno, K. Yamashita, and I. Kondo. **267**, 310, 43-C6 (1983)
- Neutral Hydrogen in X-Ray Cluster Galaxies: A1367. Guido L. Chincarini, R. Giovanelli, M. Haynes, and P. Fontanelli. **267**, 511, 46-D9 (1983)
- X-Ray Ionization and the Orion Molecular Cloud. Julian H. Krolik and Timothy R. Kallman. **267**, 610, 47-D12 (1983)
- Stellar Contributions to the Hard X-Ray Galactic Ridge. D. M. Worrall and F. E. Marshall. **267**, 691, 48-C11 (1983)
- MSH 15-52: A Supernova Remnant Containing Two Compact X-Ray Sources. F. D. Seward, F. R. Harnden, Jr., P. Murdin, and David H. Clark. **267**, 698, 48-D4 (1983)
- The Period History of the X-Ray Pulsar in MSH 15-52. M. C. Weisskopf, R. F. Elsner, W. Darbro, D. Leahy, S. Narayan, P. G. Sutherland, J. E. Grindlay, F. R. Harnden, Jr., and F. D. Seward. **267**, 711, 48-E5 (1983)
- X-Ray Burst Observations of Serpens X-1. M. Sztajno, E. M. Basinska, L. R. Cominsky, F. J. Marshall, and W. H. G. Lewin. **267**, 713, 48-E7 (1983)
- X-Ray Studies of Quasars with the Einstein Observatory. III. The 3CR Sample. H. Tananbaum, J. F. C. Wardle, G. Zamorani, and Y. Avni. **268**, 60, 52-E9 (1983)
- Extended Soft X-Ray Emission from NGC 4151. Martin Elvis, Ulrich G. Briel, and J. Patrick Henry. **268**, 105, 53-A13 (1983)
- High-Velocity, Asymmetric Doppler Shifts of the X-Ray Emission Lines of Cassiopeia A. T. H. Markert, C. R. Canizares, G. W. Clark, and P. F. Winkler. **268**, 134, 53-D12 (1983)
- Simultaneous X-Ray and Ultraviolet Observations of  $\epsilon$  Orionis and  $\kappa$  Orionis. Joseph P. Cassinelli, Lee Hartmann, W. T. Sanders, A. K. Dupree, and Roy V. Myers. **268**, 205, 54-B14 (1983)
- Redshift Modifications to HEAO A-1 Cluster X-Ray Luminosities. M. P. Kowalski, M. P. Ulmer, and R. G. Cruddace. **268**, 540, 59-A1 (1983)
- Accretion-driven Star Formation in Central Dominant Galaxies in X-Ray Clusters. Craig L. Sarazin and Robert W. O'Connell. **268**, 552, 59-B2 (1983)
- The Central X-Ray Source in RCW 103: Evidence for Blackbody Emission. I. R. Tuohy, G. P. Garmire, R. N. Manchester, and M. A. Dopita. **268**, 778, 61-E14 (1983)
- Ring Ejection in Type II Supernovae: 1E 0102.2-7219 in the Small Magellanic Cloud. Ian R. Tuohy and Michael A. Dopita. **268**, L11, 57-A11 (1983)
- Detection of  $10^{10} M_{\odot}$  of Hot Gas in the Normal Elliptical Galaxy NGC 5846 with the Einstein Satellite. Peter Biermann and Philipp P. Kronberg. **268**, L69, 63-E1 (1983)
- G29.7-0.3: Another Supernova Remnant with an Identity Crisis. R. H. Becker, D. J. Helfand, and A. E. Szymkowiak. **268**, L93, 63-F9 (1983)
- An X-Ray Survey of Nine Algol Systems. N. E. White and F. E. Marshall. **268**, L117, 64-A9 (1983)
- Optical and X-Ray Observations of Faint Quasars in an Optically Selected Sample. H. L. Marshall, H. Tananbaum, G. Zamorani, J. P. Huchra, A. Braccetti, and V. Zitelli. **269**, 42, 65-D9 (1983)
- Einstein Observations of the Rho Ophiuchi Dark Cloud: An X-Ray Christmas Tree. Thierry Montmerle, Lydie Koch-Miramond, Edith Falgarone, and Jonathan E. Grindlay. **269**, 182, 67-A11 (1983)
- The Soft X-Ray Spectrum of the Vela Supernova Remnant. Steven M. Kahn, Jean Brodie, Stuart Bowyer, and Philip A. Charles. **269**, 212, 67-D12 (1983)
- Observations of Suspected Low-Mass Post-T Tauri Stars and Their Evolutionary Status. Reinhard Mundt, Frederick M. Walter, Eric D. Feigelson, Ulrich Finkenzeller, George H. Herbig, and Andrew P. Odell. **269**, 229, 67-F3 (1983)
- The Pulse Profile of the Crab Pulsar in the Energy Range 45 keV-1.2 MeV. R. B. Wilson and G. J. Fishman. **269**, 273, 68-B8 (1983)
- The Optical Identification Content of the Einstein Observatory Deep X-Ray Survey of a Region in Pavo. R. E. Griffiths, S.



- S. Murray, R. Giacconi, J. Bechtold, Paul Murdin, Malcolm Smith, H. T. MacGillivray, Martin Ward, John Danziger, Jan Lub, Bruce A. Peterson, Alan E. Wright, M. J. Batty, D. L. Jauncey, and David F. Malin. **269**, 375, 70-E2 (1983)
- X-Ray Observations of 20 3CR Radio Galaxies and Their Environments. Eric D. Feigelson and Christophe J. Berg. **269**, 400, 70-G7 (1983)
- 2-165 keV Observations of Active Galaxies and the Diffuse Background. R. E. Rothschild, R. F. Mushotzky, W. A. Baity, D. E. Gruber, J. L. Matteson, and L. E. Peterson. **269**, 423, 71-B2 (1983)
- X-Ray Sources in Molecular Clouds. Stephen Lepp and Richard McCray. **269**, 560, 72-E7 (1983)
- H0547-14: X-Ray Flux from a Weak Gamma-Ray Burst? C. Ambruster, K. S. Wood, J. F. Meekins, D. J. Yentis, H. W. Smathers, E. T. Byram, T. A. Chubb, and H. Friedman. **269**, 779, 75-A6 (1983)
- Observations of Two Gamma-Ray Bursts by Vela X-Ray Detectors: Erratum. J. Terrell, E. E. Fenimore, R. W. Klebesadel, and U. D. Desai. **269**, 806, 75-C5 (1983) (Orig. paper in **254**, 279, 29-A12)
- Rapid X-Ray Variability from the Seyfert I Galaxy NGC 4051. F. E. Marshall, S. S. Holt, R. F. Mushotzky, and R. H. Becker. **269**, L31, 76-A7 (1983)
- Low-Ionization Active Galactic Nuclei: X-Ray or Shock Heated? J. P. Halpern and J. E. Steiner. **269**, L37, 76-A12 (1983)
- Discovery of a Quasar with a Wide Angle Radio Tail in a Distant Cluster of Galaxies. D. E. Harris, P. E. Dewdney, C. H. Costain, H. Butcher, and A. G. Willis. **270**, 39, 77-D4 (1983)
- Hard X-Ray Observations of the Crab Nebula and A0535+26 with a High Energy Resolution Spectrometer. J. M. Hammeury, D. Boclet, Ph. Durouchoux, T. L. Cline, W. S. Paciesas, B. J. Teggarden, J. Tueller, and R. C. Haymes. **270**, 144, 78-D14 (1983)
- Irregular X-Ray Variability in the Transient X-Ray Burst Source MXB 1659-29. L. Cominsky, W. Ossman, and W. H. G. Lewin. **270**, 226, 79-D1 (1983)
- Radio and X-Ray Observations of the Radio Halo Source in A1367. G. Gavazzi and G. Trinchieri. **270**, 410, 82-E12 (1983)
- A Search for X-Ray Emission from Optically Quiet, Compact Radio Sources. J. E. Ledden and S. L. O'Dell. **270**, 434, 83-A1 (1983)
- The Discovery of an X-Ray Bright BL Lacertae Object: 0414+009. M. P. Ulmer, Robert L. Brown, D. A. Schwartz, J. Patterson, and R. G. Cruddace. **270**, L1, 81-A2 (1983)
- Optical Candidates for the 1978 November 19 Gamma-Ray Burst Source. H. Pedersen, C. Motch, M. Tarengi, J. Danziger, G. Pizzichini, and W. H. G. Lewin. **270**, L43, 87-A14 (1983)
- Einstein Observations of X-Ray Emission from A Stars. L. Golub, F. R. Harnden, Jr., C. W. Maxson, R. Rosner, G. S. Vaiana, Webster Cash, Jr., and Theodore P. Snow, Jr. **271**, 264, 90-G11 (1983)
- X-Rays from Radio Pulsars: The Detection of PSR 1055-52. Andrew F. Cheng and David J. Helfand. **271**, 271, 91-A4 (1983)
- Pulselike Character of Blackbody Radiation from Neutron Stars. George Greenstein and Gregory J. Hartke. **271**, 283, 91-B2 (1983)
- The X-Ray Luminosity Function of Very Rich Clusters and the Luminosity-Richness Relation. Andrzej Soltan and J. Patrick Henry. **271**, 442, 94-C2 (1983)
- X-Ray Survey of Clusters of Galaxies with the Einstein Observatory. Frank Abramopoulos and William H.-M. Ku. **271**, 446, 94-C6 (1983)
- VLA Observations of a Complete Sample of Extragalactic X-Ray Sources. II. Isabella M. Gioia, E. D. Feigelson, T. Maccaro, R. Schild, and G. Zamorani. **271**, 524, 95-C1 (1983)
- The Relationship between the X-Ray and Optical Luminosities for QSOs. W. H. Tucker. **271**, 531, 95-C8 (1983)
- Electrodynamic Coupling in Magnetically Confined X-Ray Plasmas of Astrophysical Origin. James A. Ionson. **271**, 778, 98-A6 (1983)
- Simultaneous U, B, V, and X-Ray Measurements of a Burst from 4U/MXB 1636-53. A. Lawrence, L. Cominsky, C. Engelke, G. Jernigan, W. H. G. Lewin, M. Matsuoka, K. Mitsuda, M. Oda, T. Ohashi, H. Pedersen, and J. van Paradijs. **271**, 793, 98-B8 (1983)
- G296.05-0.50—A Large-Diameter Supernova Remnant. J. L. Caswell and Peter J. Barnes. **271**, L55, 100-A13 (1983)
- Cygnus X-1: Optical Variation on the 294 Day X-Ray Period. J. C. Kemp, M. S. Barbour, G. D. Henson, D. J. Kraus, I. G. Nolt, J. V. Radostitz, W. C. Priedhorsky, J. Terrell, and E. N. Walker. **271**, L65, 100-B8 (1983)
- Two-dimensional Spectrophotometry of the Cores of X-Ray Luminous Clusters. L. L. Cowie, E. M. Hu, E. B. Jenkins, and D. G. York. **272**, 29, 101-C6 (1983)
- The Extraordinary Extragalactic Supernova Remnant in NGC 4449. II. X-Ray and Optical Investigations. William P. Blair, Robert P. Kirshner, and P. Frank Winkler, Jr. **272**, 84, 102-A3 (1983)
- X-Rays and Rotation among Post-T Tauri G Stars in Orion Ic. Myron A. Smith, Steven H. Pravdo, and William H.-M. Ku. **272**, 163, 102-G2 (1983)
- A Search for X-Rays from Runaway Stars. C. Krishna Kumar, Timothy R. Kallman, and Roger J. Thomas. **272**, 219, 103-D5 (1983)
- On Searches for Periodic Pulsed Emission: The Rayleigh Test Compared to Epoch Folding. D. A. Leahy, R. F. Elsner, and M. C. Weisskopf. **272**, 256, 103-F14 (1983)
- HEAO 1 Observations of Quiescent X-Ray Emission from Flare Stars: Erratum. Vassiliki Tsikoudi. **272**, 381, 105-B8 (1983) (Orig. paper in **262**, 263, 124-A1)
- X-Ray, Optical, and Radio Observations of the Blue Galaxy Butcher-Oemler 6 in the 3C 295 Cluster. J. Patrick Henry, John T. Clarke, Stuart Bowyer, and Russell J. Lavery. **272**, 434, 106-D14 (1983)
- The X-Ray Emitting Gas in Poor Clusters with Central Dominant Galaxies. Gerard A. Kriss, Denis F. Cioffi, and Claude R. Canizares. **272**, 439, 106-E7 (1983)
- Radiative Accretion of Intracluster Gas onto Dominant Galaxies in Poor Clusters. Claude R. Canizares, Gordon C. Stewart, and Andrew C. Fabian. **272**, 449, 106-F6 (1983)
- Outer Atmospheres of Cool Stars. XIV. A Model for the Chromosphere and Transition Region of Beta Ceti (G9.5 III). Kjell Eriksson, Jeffrey L. Linsky, and Theodore Simon. **272**, 665, 109-A13 (1983)
- An Identification for "Geminga" (2CG 195+04) 1E 0630+178: A Unique Object in the Error Box of the High-Energy Gamma-Ray Source. G. F. Bignami, P. A. Caraveo, and R. C. Lamb. **272**, L9, 105-D13 (1983)
- X-Ray and UV Observations of the BL Lacertae Object 3C 66A. D. Maccagni, L. Maraschi, E. G. Tanzi, M. Tarengi, and L. Chiappetti. **273**, 75, 113-A1 (1983)
- The Einstein Observatory Medium Sensitivity Survey: Optical Identifications for a Complete Sample of X-Ray Sources. John T. Stocke, J. Liebert, I. M. Gioia, R. E. Griffiths, T. Maccaro, I. J. Danziger, D. Kunth, and J. Lub. **273**, 458, 118-D12 (1983)
- Origins and Ages of X-Ray-Luminous Dwarf M Stars. Hugh M. Johnson. **273**, 702, 121-C7 (1983)
- Long-Term X-Ray Observations of Centaurus X-3, GX 301-2 (4U 1223-62), GX 304-1 (4U 1258-61), and 4U 1145-61. W. C. Priedhorsky and J. Terrell. **273**, 709, 121-C14 (1983)
- Einstein Observations of NGC 4438: Dynamical Ablation of Gas in the Virgo Cluster. C. Kotanyi, J. H. van Gorkom,

**X-Rays: Sources—Continued**

- and R. D. Ekers. **273**, L7, 117-B7 (1983)
- A New Distance to Cygnus X-3. John M. Dickey. **273**, L71, 123-B8 (1983)
- Gamma-Ray Observations toward NGC 1275, and the Origin of the Emission in the Infrared, X-Rays, and Gamma-Rays. A. W. Strong and G. F. Bignami. **274**, 549, 131-C6 (1983)
- On the Coronae of Rapidly Rotating Stars. IV. Coronal Activity in F Dwarfs and Implications for the Onset of the Dynamo. F. M. Walter. **274**, 794, 134-A12 (1983)
- A Thermal Interpretation of the X-Ray Spectra of Quasars, Active Galactic Nuclei, and Cygnus X-1. P. Mészáros. **274**, L13, 129-A12 (1983)
- X-Ray Observations of LMC X-3 with the Monitor Proportional Counter aboard the *HEAO 2 Einstein Observatory*: A Comparison with Cygnus X-1. M. C. Weisskopf, S. M. Kahn, W. D. Darbro, R. F. Elsner, J. E. Grindlay, S. Narayan, P. G. Sutherland, and A. C. Williams. **274**, L65, 136-B7 (1983)
- Einstein X-Ray Observations of Optical-Radio Selected Areas. P. Katgeri, Trinh X. Thuan, and Rogier A. Windhorst. **275**, 1, 137-A6 (1983)
- Luminosity Correlations in Quasars. Gary A. Chanan. **275**, 45, 137-D9 (1983)
- An X-Ray Survey of Globular Clusters and Their X-Ray Luminosity Function. Paul Hertz and Jonathan E. Grindlay. **275**, 105, 138-B13 (1983)
- X-Ray Studies of BL Lacertae Objects with the *Einstein Observatory*: Confrontation with the Synchrotron Self-Compton Predictions. Greg M. Madejski and Daniel A. Schwartz. **275**, 467, 142-E12 (1983)
- X-Ray Observations of M33 with the High Resolution Imager on the *Einstein Observatory*. Thomas H. Markert and Andrew D. Rallis. **275**, 571, 143-F14 (1983)
- X-Ray Emission from Radio Pulsar Winds. Andrew F. Cheng. **275**, 790, 146-B13 (1983)
- A Giant X-Ray Flare in the Hyades: Erratum. Robert A. Stern, James H. Underwood, and Spiro K. Antiochos. **275**, L25, 141-G9 (1983) (Orig. paper in **264**, L55, 11-B11)
- The Filaments of NGC 1275: A Collision between a Galaxy and an Accretion Flow? E. M. Hu, L. L. Cowie, P. Kaaret, E. B. Jenkins, D. G. York, and F. L. Roesler. **275**, L27, 148-A4 (1983)
- A Spectrographic Orbit for LMC X-1: Another Massive X-Ray Source? J. B. Hutchings, D. Crampton, and A. P. Cowley. **275**, L43, 148-B11 (1983)
- HEAO A-2* Soft X-Ray Source Catalog. J. J. Nugent, K. A. Jensen, J. A. Nousek, G. P. Garmire, K. O. Mason, F. M. Walter, C. S. Bowyer, R. A. Stern, and G. R. Riegler. **51**, 1, 1-A2 (1983) (Abstr. in **263**, 1007, 142-F8)
- Supernova Remnants in the Magellanic Clouds. D. S. Mathewson, V. L. Ford, M. A. Dopita, I. R. Tuohy, K. S. Long, and David J. Helfand. **51**, 345, 7-F1 (1983) (Abstr. in **266**,

902, 38-B11)

- A Near-Infrared and Optical Study of X-Ray Selected Seyfert Galaxies. I. Observations. Christopher W. McAlary, R. A. McLaren, R. J. McGonegal, and J. Maza. **52**, 341, 15-A8 (1983) (Abstr. in **270**, 779, 86-E6)

**X-Rays: Spectra**

- A Feature in the X-Ray Spectrum of Cygnus X-1: A Possible Positron Annihilation Line. P. L. Nolan and J. L. Matteson. **265**, 389, 16-C13 (1983)
- Inner-Shell Transitions in Fe XIX–XXII in the X-Ray Spectra of Solar Flares and Tokamaks. K. J. H. Phillips, J. R. Le-men, R. D. Cowan, G. A. Doschek, and J. W. Leibacher. **265**, 1120, 25-A10 (1983)
- Why Are Broad Emission Lines Seen in Seyfert Galaxies and Not in BL Lacertae Objects? P. W. Guilbert, A. C. Fabian, and Richard McCray. **266**, 466, 33-D6 (1983)
- High-Velocity, Asymmetric Doppler Shifts of the X-Ray Emission Lines of Cassiopeia A. T. H. Markert, C. R. Canizares, G. W. Clark, and P. F. Winkler. **268**, 134, 53-D12 (1983)
- X-Ray Spectra and Light Curves of Accreting Magnetic Degenerate Dwarfs. James N. Imamura and Richard H. Durisen. **268**, 291, 55-B4 (1983)
- The Soft X-Ray Spectrum of the Vela Supernova Remnant. Steven M. Kahn, Jean Brodie, Stuart Bowyer, and Philip A. Charles. **269**, 212, 67-D12 (1983)
- 2–165 keV Observations of Active Galaxies and the Diffuse Background. R. E. Rothschild, R. F. Mushotzky, W. A. Baily, D. E. Gruber, J. L. Matteson, and L. E. Peterson. **269**, 423, 71-B2 (1983)
- X-Ray Spectra of Orion OB Supergiants. Joseph P. Cassinelli and J. H. Swank. **271**, 681, 97-A1 (1983)
- The X-Ray Spectra of the BL Lacertae Objects PKS 0548–322 and 3C 66A. Dario Maccagni, Tommaso Maccacaro, and Massimo Tarenghi. **273**, 70, 112-G8 (1983)
- Long-Term, Hard X-Ray Observations of Scorpius X-1 from *HEAO 1*. Y. Soong and R. E. Rothschild. **274**, 327, 127-C14 (1983)
- Observations of a Hard X-Ray Component in the Spectrum of Nova Ophiuchi. C. K. Wilson and R. E. Rothschild. **274**, 717, 133-C2 (1983)
- The State of Cygnus X-1. J. C. Ling, W. A. Mahoney, W. A. Wheaton, A. S. Jacobson, and L. Kaluzienski. **275**, 307, 140-D1 (1983)
- X-Ray Line Emission from Supernova Remnants. I. Models for Adiabatic Remnants. Andrew J. S. Hamilton, Craig L. Sarazin, and Roger A. Chevalier. **51**, 115, 2-E1 (1983) (Abstr. in **263**, 1005, 142-F6)

**Zeeman Effect**

- Laboratory Detection of the C<sub>2</sub>N and C<sub>2</sub>H Free Radicals. C. A. Gottlieb, E. W. Gottlieb, P. Thaddeus, and H. Kawamura. **275**, 916, 147-E3 (1983)







